NATURE MAGAZINE

SEPTEMBER 1924

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THE TREE-PLANTING ARMY

Planting of trees either by the state or by the individual is a duty and not a job.
—Charles Lathrop Pack, President, American Tree Association.

The Tree-Planting Army now must show a united front, for soon the state legislatures will be in session. With the passage of the McNary Clarke forestry bill much work is to be done in completing this, the first big step toward a national forest policy in this country. The federal legislation *does not* appropriate any money; it authorizes the appropriation of money, provided the states appropriate money for forestry work. This means every member of the Tree-Planting Army should make it his business to call the attention of the members of his state legislature to the importance of forestry legislation when the legislature meets. The first step is to put the facts before any organization of which you are a member. Then write your governor and ask him to give forestry legislation a place in his annual message. Write to the members of your state legislature yourself. Only as each state does something will the Federal Government cooperate. Report any action you take to the American Tree Association.

Plans for planting the first memorial tree for Calvin Coolidge, Jr., are being made by Mrs. George L. Cope, of the W. R. C., and the Boy Scouts of LeRoy, Ill.

Mayor Charles C. Hawk, of Shawnee, Okla., writes, "this is great work in the right direction," in applying for membership in the Tree-Planting Army.

K. Yashiroda, of Kagawaken, Japan, makes application for membership in the Tree-Planting Army.

The Phi Kappa Sorority at Hartford, Ind., has planted a tree on the grounds of the Blackford County Hospital.

Another to join the tree planters is Ciriaco Estrada, of Tayabas, P. I., who outlines the work in the schools there and says he hopes to get many members there.

The Santa Cruz Chapter of the D. A. R. has joined the Tree-Planting Army, of which there are thousands in California, by planting trees for the Unknown Soldier and for departed members of the chapter. Mrs. Minnie A. Bachman has registered the trees for the Unknown Soldier and the chapter is marking them.

Morristown Lodge of Elks featured Flag Day by planting two memorial trees for New Jersey members who died in their country's service in the World War. Mayor Clyde Potts was the speaker at the tree planting.

Planting of trees about the Harding High School at Marion, Ohio, has been completed under the direction of Mrs. M. H. Frank, of the civic committee of the Marion County Federation of Women's Clubs.

Shiloh Circle of the G. A. R. planted two memorial trees for members of the Hyde Park Post No. 78 and for Shiloh Circle No. 37. Prof. Bayless, Mrs. G. C. Miller and Bayrad H. Esmay were the speakers.

In Georgia the Brunswick Board of Trade plans a tree-planting campaign in the schools. A magnificent Road of Remembrance has been made along the Brunswick-St. Simons Highway by the planting of palms at the direction of E. L. Stephens, of the Board of Bridge Commissioners. Fred. G. Warde, of the Board of Trade is making plans for the school planting.

At Willard, Ohio, the Woman's Federation has planted a Road of Remembrance and marked all the trees. In the list registered with the American Tree Association by Mrs. C. W. Neiswonger were trees for Warren G. Harding, Woodrow Wilson, Theodore Roosevelt, Cardinal Gibbons, Soldiers of the World War, and for many individuals by the organizations in the federation.

Citizens of Merrimac, Mass., turned out for tree planting in the town forest, and more than 5,000 trees were planted. Tree Warden Ford and Frank R. Rand spoke on the value of the work to future generations.

Fifteen thousand trees will be planted this fall by the city of St. Petersburg, Fla.

War mothers of Chester, Pa., planted a memorial tree in Deshong Park. It was dedicated by Mrs. Lydia Higgins, who gave two sons to her country in the World War.

Boy Scouts of Watertown, N. Y., have planted thousands of Scotch pines at the direction of E. M. Blanchard, scout executive.

The I. O. O. F. Memorial Elm has been planted by the Hightstown, N. J., Lodge No. 57. The speaker at the ceremony was C. W. Letzgus, of Gloucester.

The only way to join the American Tree Association is to plant a tree and register it with the Association, 1214 Sixteenth Street N.W., Washington, D. C. The Association will send tree-planting suggestions and a tree-day program for two cents to pay postage. Make your fall tree-planting plans now.

Reproduction from a painting of Harbel Manor, the estate of H. S. Firestone, Akron, Ohio, by Frank Swift Chase

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Danger symptoms in your trees

Are the leaves of any one of your trees turning brown prematurely? In many cases this is caused by a lack of water or possibly by a lack of food. It might indicate a gas leak or some special disease.

Are any of the leaves yellowish? The leaves of most trees have a rich dark green color, and a yellowish appearance often indicates a lack of water, or a lack of food in the soil (probably nitrogen), or both.

Are any of the leaves undersized? This generally indicates a lack of food elements; namely, nitrogen, phosphorous and potassium. A tree requires food just the same as any other living thing.

Is the foliage of any tree thin or sparse? This usually indicates a lack of both water and food. It might mean an attack by a specific insect or disease.

Is any tree dying back at the top? This might signify that the roots had been smothered, or cut too severely, or drowned, or that the water had been drained away. It might indicate a lack of food elements, or a serious insect attack.

Is any tree full of dead branches? If so, the tree may be too dense, or it may be suffering from a specific disease or insect enemy. Dead branches are a menace to the health of a tree.

Is the bark splitting or falling off? This might be caused by frost injury, or sun scald, or gas poisoning, or some mechanical injury.

Does any tree have a V-shaped crotch? Is this crotch starting to split apart? If not, it is only a question of time until it will. Splitting crotches are often indicated by a large bulge on either side, or by discolored water oozing out.

Are there any decaying cavities? Open cavities are easily observed, but many times decay is hidden. Decay results from active fungous diseases; once started, it never stops until arrested by human skill. The principles of treatment are somewhat similar to dentistry. Hidden decay may be indicated by a swollen place on the trunk, or by a sunken bark area or by a dried bark area, or by a bark discoloration, or by small holes. Sometimes it is indicated by wood dust on the bark or on the ground.

A tree with any of these symptoms needs a real Tree Surgeon. It is on the way to premature death. It might be too far gone to save, but if it is possible to save it Davey Tree Surgeons can do it. Write or wire nearest office.

Among prominent persons and institutions served by Davey Tree Surgeons are the following:

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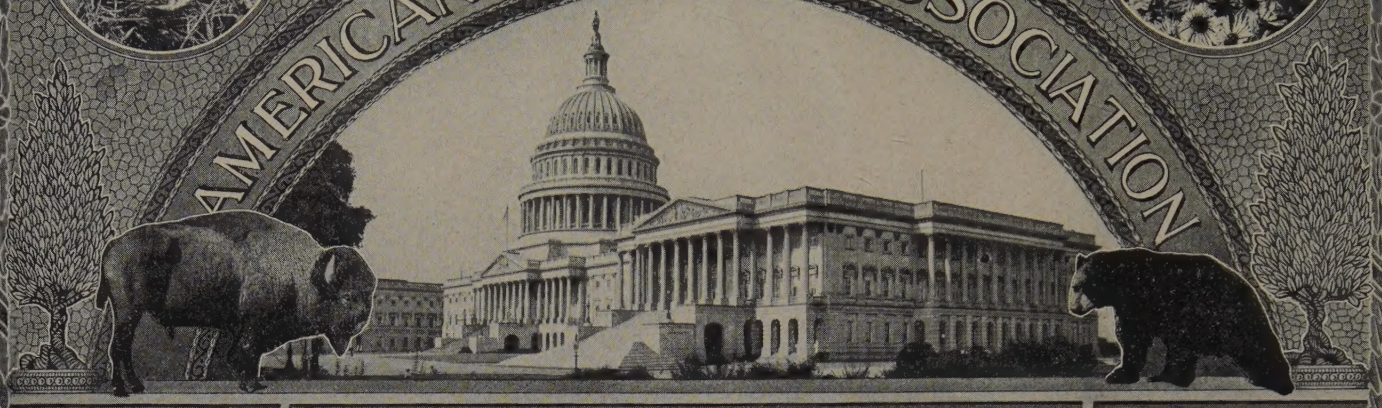
AMERICAN NATURE ASSOCIATION



WASHINGTON, D. C.

Organized to stimulate public interest in every phase of Nature and the Out of Doors, and devoted to the practical conservation of the great Natural Resources of America.

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NATURE MAGAZINE

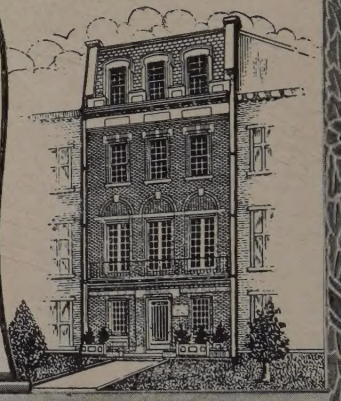
AT LAST, an adequate meeting-place has been provided for the Fraternity of the Great Outdoors. NATURE MAGAZINE has come in answer to a long-felt want - a monthly magazine where the child and the grown-up alike may revel in pictures and stories of birds, trees, beasts, fish, plants and other living, breathing evidence of the Creator's handiwork.

To every man, woman and child who thrills to the chirp of birds, to the friendly wag of a dog's tail, to the woodsy tang of cool, wet moss and the soft rustle of wind through the topmost branches of leafy trees, NATURE MAGAZINE will be a monthly treat.

You will find in NATURE MAGAZINE a publication perfectly attuned to YOUR nature, feeling the things that you feel and expressing your thoughts. You will find instruction through the medium of entertainment. You will agree that here is not "just another periodical," but a publication with a real purpose.

You are urged to send your name and address at once, with $2.00 for membership in American Nature Association, including NATURE MAGAZINE.

Subscription price to non-members is $2.50 a year



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I desire membership in the American Nature Association, including NATURE MAGAZINE each month, and such bulletins and information as are given to members. I will remit $2.00 for one year's dues upon receipt of your bill.

90% of the annual dues is designated for subscription to the magazine

Name.....

Street.....

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September

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Street.....

City.....

September

Nature Calendar

SEPTEMBER

These are the days of wondrous blue skies flecked with clouds of fleecy white and cool gentle breezes.

Gorgeous sunsets mark the close of the perfect September day.

> "The clouds are at play in the azure space
> And their shadows at play on the bright green vale.
> And here they stretch to the frolic chase;
> And there they roll on the easy gale."

Goldenrod, brilliantly plumed, is at the height of bloom.

Nature is lavish with its Goldenrods, there being over eighty known species. Not all, however, are common to this country.

A bed of Salvia, ablaze with scarlet, is one of the most attractive features of the garden.

The Hawthorn is begemmed with bright crimson "haws."

September is indeed our "golden month." Large patches of Swamp Sunflowers, surging meadows of Goldenrods and Golden Asters in profusion, cast a golden glow over the countryside.

A trail of cylindrical seed-pods is left in the wake of the flowers of the Common Mustard as they follow the blossoms up the spike.

Boneset, with its many tiny terminal florets, is a favorite of beetles, bees and flies but is not so attractive to butterflies.

Pumpkin vines bearing beautiful star-shaped yellow flowers wind in and out among the corn stalks. Here and there bright orange pumpkins peek out from under the leaves.

Black-eyed Susans, rich in pollen, are covered with insects of many kinds.

Roadsides and fields are brightened with the purple thistle-like flowers of the Ironweed.

Glorious tints of gold, crimson and orange begin to appear among the more sombre shades of summer's foilage.

The leaves of the Poison Ivy are among the first to change to beautiful flaming red. Beware this tempter!

Purple Asters make beautiful the weed-tangled fields.

Large prickly burs are formed on the Chestnut trees.

This is mushroom time. Learn the edible from the poisonous before you sample.

Staghorn Sumacs are decorated with pompons of dark crimson fruit clusters.

September is our harvest month.

Large red-cheeked apples burden the boughs of the Apple trees.

What a tireless troubadour is the cricket! Long into the night you may hear his rhythmic song.

Soldier-beetles are abundant on Goldenrod and other meadow flowers.

After carefully hiding her egg-sac in a secluded spot, the Grass Spider dies.

The Cecropia caterpillar is now spinning a "cradle" cocoon from a sheltering branch of a tree or bush.

Look for the larvae of the Black Swallowtail on the leaves of the carrot or other root vegetables. It is green, ringed with black and spotted with yellow.

Young Cricket Frogs have outgrown their tadpole vestiges and are now full-grown adults.

By this time the young of the Red Squirrel are difficult to distinguish from their parents.

Denser vegetation and absence of song make the fall bird migration more difficult to observe than the spring.

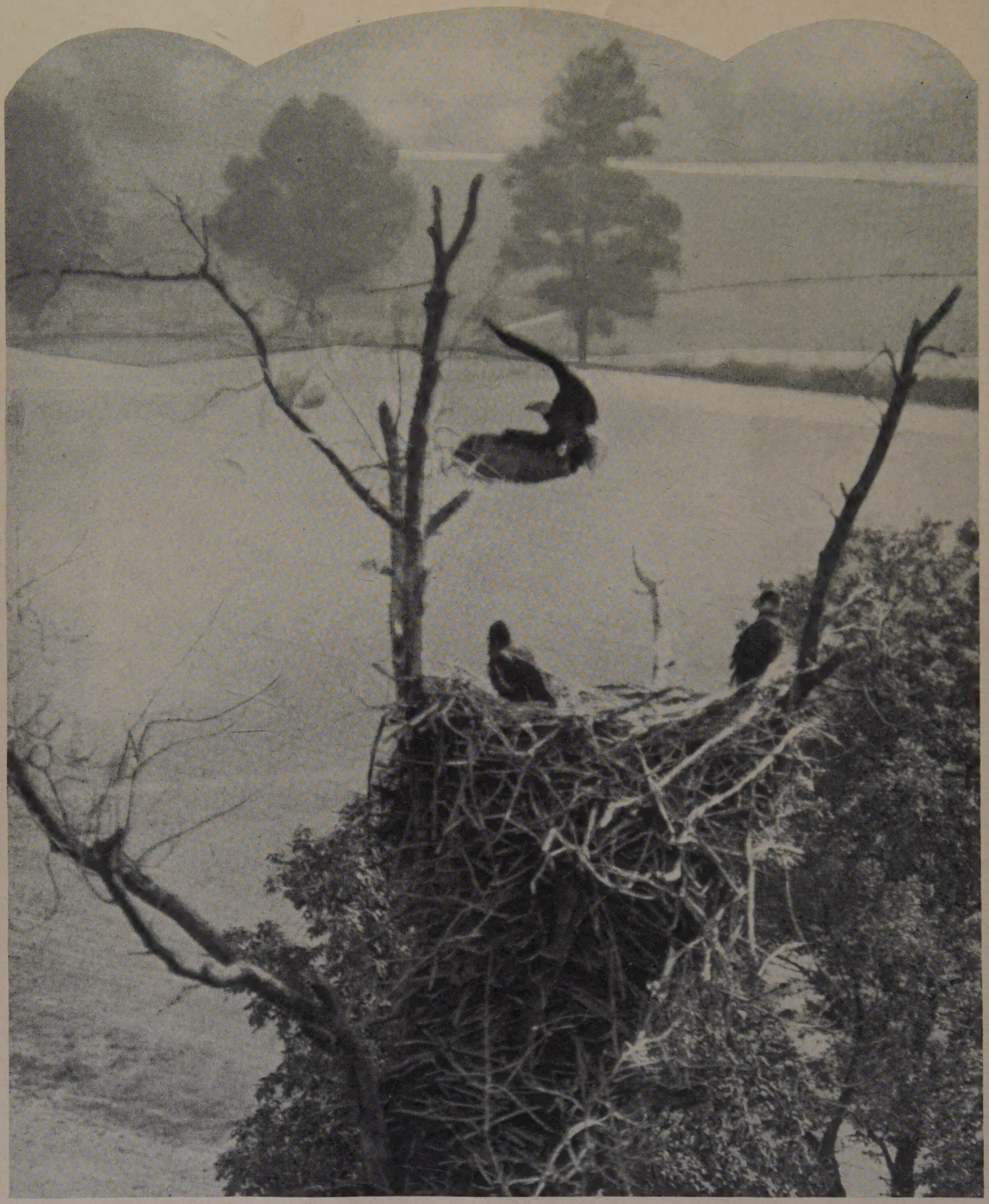
Black and White Warblers have started on their southward journey. Chimney Swifts, too, are migrating.

The Bobolink, feathered less conspicuously than during the summer, now travels under the name of Reedbird or Ricebird.

Goldfinches are nesting. They line their nests with the soft fluffy silk of the thistle.

Toward the end of the month the first winter bird residents will arrive and after that they rapidly become fewer in number.

Prepared for NATURE MAGAZINE by the Cleveland Museum of Natural History



EAGLES' NEST, WEIGHING ABOUT A TON, AND SEVEN FEET FROM BASE TO TOP

The old eagle has just left the nest-perch, the short stub which rises from the far side of the eyrie, and is turning in the air. Notice that the young are watching her movements.

NATURE MAGAZINE

Vol. IV SEPTEMBER, 1924 No. 3

To him who in the love of Nature holds communion with her visible forms, she speaks a various language.—BRYANT.

Family Life of the American Eagle

An Account of Close Observation of What Goes On in the Nest of an Eagle When the Eaglets Are Growing

By PROF. FRANCIS H. HERRICK

IT WAS decided to carry out a plan of observing the eyrie of the American eagle for an intimate study of its domestic life. The attempt had not been made before. It was to be a new chapter in the study of American birds and one of peculiar interest—the unfolding drama of the life of the "King of Birds," which for 142 years has been the chosen symbol of the independence and sovereignty of the United States.

We have in the United States but two well-marked eagles, the "American," White-headed or Bald Eagle (Haliæetus leucocephalus), which ranges over nearly the whole of the North American continent, and the more cosmopolitan Golden Eagle (Aquila chrysaëtos), which wanders far and wide over every great continent of the world, excepting only South America and Australia, and in the United States is now mainly confined to the region west of the Mississippi valley. The American eagle frequents both coasts, but is most common in Florida, the Great Lakes region, and in the northwest, particularly in Alaska, where from its greater size it is distinguished as a variety or sub-species, and where the territorial legislature has ignominiously set a price upon its white head. Since this bird is an indigenous American and the term "white-headed" is cumbersome and the name "bald eagle" obviously inappropriate, it seems best to use the popular designation "American eagle" for our national bird.

THE AMERICAN EAGLE, ONE YEAR OLD

Where the plumage is ruffled, the light lower parts of each feather appear as white spots. The white head and neck are not attained until the third year or after.

The eagle

is usually content to settle down, whether in the wilderness or in the neighborhood of man, wherever the supply of fish or water-fowl promises a good living; except in rare instances where the isolation of small and remote islands afford it all needed protection, it commonly skies its eyrie in lofty trees, at a height of about eighty feet, or in extreme cases of even one hundred and fifty feet from the ground.

The most remarkable and most picturesque nest which it has been my good fortune to see stands in the broken and now dead top of a shellbark hickory, in an open grove in the town of Vermilion, Ohio, and about a mile from the shore of the lake. Its form is that of a wineglass or inverted cone, and when its dimensions were taken in July, 1922, it was found to be twelve feet high, and eight and one half feet in greatest diameter; at that time we estimated its weight at close to one ton; a line dropped from its rim measured exactly eighty-one feet. Its great circular top was then trodden quite flat by the eaglets, for it had been their gymnasium, dining table and bed for upwards of ten weeks.

OBSERVATORY CONSTRUCTED FOR STUDYING THE EAGLE

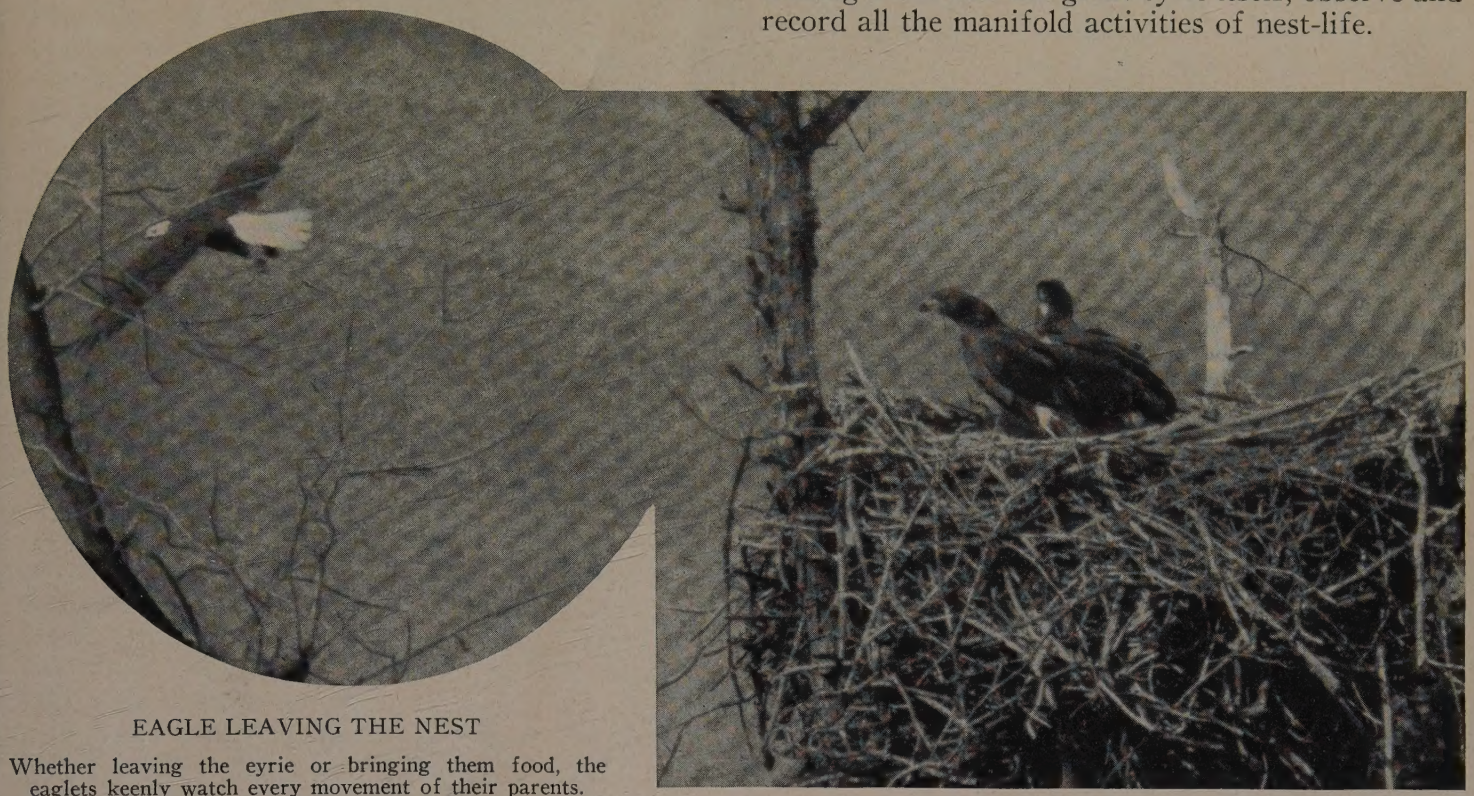
Showing platform and tent, on the front of which two peek-holes and one of the camera-windows can be seen. Parts of the steel ladder, which is mostly concealed by foilage, are shown at the top of the rail to the right and below the point where the main trunk of the tree divides; top of screened rail, 86 feet from the ground. A second platform, which brings the observer's eye up to 100 feet, was added in 1923.

With most birds the nest is hardly more than a cradle for their young, to be abandoned the moment it has served its purpose, but with the eagle it is a permanent home, the daily scene of its domestic life for nearly four months of each year, or from early March to early July in this region; a rendezvous for still another month, of the whole family, or from the time the eaglets are on the wing until they are driven out of the neighborhood by their parents; thereafter it is the occasional rallying point and lookout post of the elder pair for the remainder of the year. The eagle is no regular migrant; he may wander far—just how far will not be known until the bird-banders' records are more complete—in search of his staple food, particularly if the winters are severe, but the home tree and summer hunting grounds are never forgotten. Unlike most of our birds, too, the eagle is mated for life, and whenever a partner is lost another is quickly sought and usually found before many days have passed.

The history of the Vermilion eagles can be traced back to 1840, or for the better part of a century, during which period four nests have been built and occupied in the same neighborhood by the same birds or by their successors in this self-perpetuating partnership. The fourth and present nest was started in 1890, or a little earlier, and has been occupied each season, without a break, for upwards of thirty-four years, being added to each year until it is seven feet high. Its framework is a close mass of interlaced sticks, some of which are from three to four feet long and from two to three inches thick, all being now bleached to a light gray color. Each spring a fresh bed of straw, cornstalks and stubble

is laid on top and new sticks are incorporated with the old.

An observatory was built in a big elm tree close to the tree bearing the nest, and there the observers were hidden on a platform. Armed with a camera and binoculars, the observers spent hours daily during the nesting season observing the family life of the eagles.



EAGLE LEAVING THE NEST

Whether leaving the eyrie or bringing them food, the eaglets keenly watch every movement of their parents.

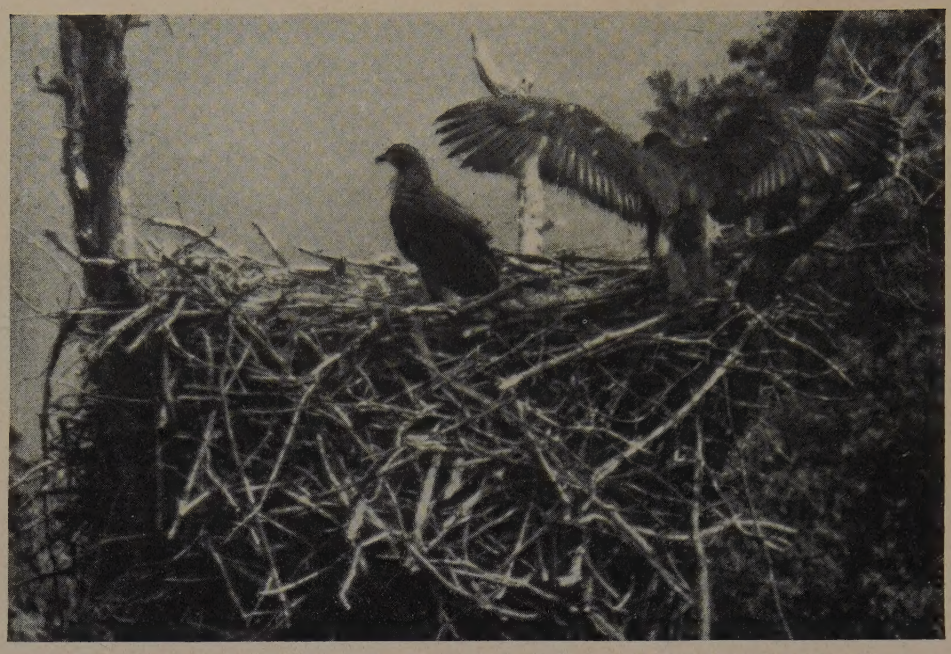
The nest life of the eagle begins with nest-building in early March, followed by egg-laying and incubation, the exact period of which has not yet been determined, but during the present season lasted between four and five weeks; a period of white down, in which the eaglet is hatched; a longer one of gray down, terminating near the end of May; and finally the stage in which the young eagles, having combed off all their down, appear in their brown juvenal dress of fresh sleek feathers; for upwards of a month the eaglets, thus robed, indulge in their remarkable instincts of play and in varied gymnastic exercises which enable them to finally leave their eyrie under their own power and serves them well in the sterner realities of later life.

We found that the daily activities of the old eagles were divided between their habitual perches, all of which were now in full view, their periodical forays to the lake and countryside for prey, and their returns with this to the eyrie, where they often feasted on their own account, while pausing to hand up pieces, bill to bill, to their young; or more commonly landing a fish or a chicken on the floor of the nest and leaving it there for the young to help themselves. From our elevated post we could follow the movements of the old birds or, looking down into the great eyrie itself, observe and record all the manifold activities of nest-life.

Though always assured of action aplenty at some time during the day, we could never tell when it would come. The visits of the old eagles with food, from two to eight in number daily, might be scattered through the morning or afternoon, or come early or late and in quick succession. We could always recognize the male eagle by his lesser size, when seen with his mate, and the female by her more sinister countenance, due, perhaps, to the greater width of the growth which juts out over each eye. At all events her visage was always expressive of scorn and defiance, suggesting that she trusted no one, and from no one would tolerate the least nonsense or interference. The male, like his mate, was wary and alert, but his yellow, restless eyes, though seeming to take in his whole environment at a glance, carried no such evil forebodings when gazing at you direct.

In the observations of the past two seasons covering the late nest-life and comprising thirty-six full days of twelve to thirteen hours each, we have recorded one hundred and nine visits of the eagles to their eyrie; the food delivered included eighty-seven fish, among which we could recognize such common forms as lake catfish, sheepshead, sand and blue pike, carp and perch, in any case often lacking

the head, and of all sizes up to three or four pounds; thirteen chickens, which were commonly plucked and also often wanting the head, besides one wild bird, probably a killdeer plover, the capture of which we watched from the tent; once a mass of stubble and twice green oak leaves were brought and left on the eyrie; once the food delivered could not be seen or inferred, and on four occasions the birds came empty-handed.



FIRST STAGE IN FLYING PRACTICE, SPREADING AND FLAPPING

His next move may be jumping up and down and prancing about the eyrie, and finally with a broad jump perhaps going over his nest mate.

The eaglets, two in number each year, usually spent the night, so far as we observed them, standing close together and bolt upright near the center of the eyrie; at dawn they would separate, go to preening their feathers, or if hungry stand astride a carcass and with head down begin to feed. After ten minutes or so the feeding bird would raise its broad wings above its head, spread them to their full extent, and begin a period of exercise, jumping up and down with both feet, or with a broad jump nearly clearing the nest from side to side. Gray down is flying from the other bird as it combs deep among the feathers of its breast and back; then spreading its tail with the feathers turned to one side it deliberately draws its bill along each quill in turn from base to apex. If particularly fastidious in its toilet, it will proceed to press the gland at the base of the tail and with repeated applications of the head anoint its plumage with a fresh layer of oil; then, upon occasion as the spirit moves, it stretches out one wing, slowly following it with the leg of the same side, and, when its lassitude is not too great, with the wing and leg of the side opposite. After erecting and shaking out all the feathers one preening operation has been concluded, but only to be repeated many times each day.

Both eaglets may spread and jump at the same time and their play, which has a direct relation to their future needs, begins; now one will seize a short stick, spread wings and tail about it, almost precisely as I have seen young hawks do many times, and set up a defiant squealing to warn off intruders, in quite the same fashion as it will later seize the fish brought in by an old bird, or the quarry of its own capture at a still later time. They will play with the green oak leaves, which have been brought to the eyrie, drag sticks about, pull them from the edge of the nest, at times even detaching some which fall to the ground below, for their superabundant energy must find an outlet. Again they will playfully pass at each other with their bills, or hold bill to bill, as when receiving food direct from an old bird; on rare occasions you may even see a "tug of war" when both birds seize opposite ends of the same stick. But the day advances, and it is now past eight o'clock; the eyrie's larder seems quite empty, and we can see that the old eagles are still on their perches. At this hour the sun shines on the very top of the massive nest, throwing every stick there into sharp outline, while all the lower parts are still in shade. The eaglets now stand close together, facing the breeze, their brown coats sleek as a new silk hat; with the glasses we can count the flick of the third eyelid, about twenty to the minute, while now and again their eyes quite close as they doze in the sun.

One of the old eagles has just left the "tall east perch"; it is the larger bird and therefore the female. She dropped down, flew over the Kishman farm, as if looking for something in the plowed field, and, rising to clear the wires at the railway lines, in a few seconds is at the lake. The sudden departure of an old eagle from its perch is always for us a good omen, for it may mean action, and plenty of it, in a few minutes, but you never can tell what eagles will do; they are a law unto themselves. We cannot predict all their diversions and may have to wait a full half-hour. Four minutes is the present record time for a journey from perch to the lake and back again with a fish to the eyrie. This time she has gone far from shore and we can barely

follow her course with the glass; she flew due north two miles, perhaps, and then veered a mile or more to the eastward, towards Lorain; her wild scream, another good sign, is barely borne to our ears from far out over the water. Ten minutes pass, and then suddenly the two eaglets wake up and take notice; in a moment more they have sensed the approach of their *alma mater* in the air. While our eyes are glued to a peek-hole and theirs are turned skyward, we see the old eagle sailing in majestically from the east, and now high over the Buehring farm; she comes with the speed of an express train, and it is soon plain that she carries a large object held low in both talons. Now action at the eyrie begins; when a quarter of a mile away the eagle veers and makes straight for her nest and the excited young begin to crouch and squeal. The quarry is probably a blue pike, a long narrow fish weighing two pounds or more. The old eagle enters from the east side, and when ten feet away suddenly applies the brakes; with wings raised, and both feet, holding the fish, extended forward, and head thrown back, she lands with a thud on the eyrie. It is a tense moment as she pauses to cast her eagle eye in every direction. If very hungry the eaglets crouch, bristle and squeal in their best efforts to scream, sometimes "freezing" in their tracks, sometimes raising both wings, but seldom crowding up to the old bird until she advances in their direction, dragging the fish. If the quarry is simply dropped on the eyrie the nearest eaglet seizes it in an instant, and spreading, bristling and squealing over it with head down, will hold this attitude for several minutes, thus claiming the booty as its own and warning off its nest-mate, which seldom ventures to interfere; but standing at a respectful distance cranes its neck in the direction of the prey and watches every movement of the feeding bird. When eaglet number one is satisfied it leaves the carcass at a bound, and while the other takes its turn at feeding it enters upon that course of exercise, which is slowly but surely preparing it for independent flight, flapping, jumping and prancing about the eyrie, and to complete the record, "shooting" from the edge of the nest.

THE EAGLE IN ACTION: BRINGING IN A FISH

The eaglets are crowding close together, bristling and squealing, ready to receive it. Notice that the tail-end of the fish only, firmly grasped in the right talon, is delivered, the other half probably having been eaten.

THE VERMILION EYRIE AS IT APPEARED IN 1922

In the following spring the foliage of the nest-tree died out almost completely. One eaglet has flown, and the other now stands, with back to the camera, on the quarry which the old eagle has just brought. Directly over the young eagle rises the stub which was used as a nest-perch in 1923.

Though habit governs the eagle, as it does all

other birds, to a certain extent, we could never count upon their approaching their eyrie twice in succession in the same way, and though we may have witnessed the spectacle for the hundredth time it never loses its fascination. Rarely they would swing round towards our observatory and enter directly from in front, with their white "fan" to the camera. Sometimes, if in any way disturbed, they would circle the nest at least once before landing; or, poising for an instant over the eyrie, they would drop like a plummet to its very center. For a time last year they had the annoying habit of flying very low as they approached from the lake, rising suddenly as they reached the nest and slipping in over its farther side; after dropping their fish they would quickly make for a favorite perch. The second visit recorded from the tent last season occurred just before six o'clock in the evening; the female sailed in from the west, with a chicken, broiler size and partly plucked, dangling from her talons; the moment it was dropped it was seized by the nearest eaglet, which spread over it, and being very hungry began ripping it open and eating as fast as it could. The old eagle, looking very keen, sullen and cautious, stood quite still for some minutes, only turning her head quickly to take in the whole situation; then she walked up to an old carcass and, planting both feet upon it, began pulling at it with her bill. While the hungry bird was devouring the chicken the other eaglet lay still in perfect repose. Presently when the mother, who was evidently quite as hungry as her young, advanced toward the feeding bird, it instantly began to spread and squeal over the prey, thus warning off its parent as if it were its nestmate; then I saw her seize a stick and drag it to another part of the eyrie, as if pent-up emotion needed some outlet in her case also. Finally, after spending eighteen and a half minutes at the nest, she quietly slid over the front and went off through the grove. The second visit of the second day of that season, occurring at about eleven o'clock on the fourteenth of June, lasted nineteen minutes and was particularly interesting. This time it was also the female, which came direct from the lake, entered on the east side and landed a blue pike; dragging it at once to the center of the nest she began to feed upon it with great voracity, while the young eagles stood by in suspense. Then she tore off chunks of the white flesh and passed them up to eaglet number one on her right, which received three pieces in succession, from bill to bill; then the eaglet on her left got five helpings directly, as before. Replete and seemingly satisfied for the time, this bird began to flap and jump and would occasionally grasp and release sticks as it romped over the eyrie. Meantime the old eagle, alternately snatching a mouthful for herself, continued to pass up pieces to number one until this bird also was stimulated to exercise. Now for a few moments there was a lively scene, the two young eagles flapping and prancing about the old bird, which still continued to work at the pike, now and again turning an eye skyward or sending a penetrating glance in our direction. After the two eaglets had worked off their energy and retired to the shade of the west side, for in that year there was considerable foliage about the top of the nest, the old eagle stood quite still for a full three minutes; then, of a sudden, she jumped off, and turning her white tail towards us, sailed away and in another moment was preening at leisure on her favorite "tall east perch."

Eaglet balancing on one foot on the nest-perch.

MALE EAGLE STANDING GUARD ON NEST-PERCH

The two hardly visible eaglets are lying flat in the eyrie.

Towards the close of June, 1922, the young eagles, in their flapping and jumping exercises, began to rise more and more above the floor of their eyrie; and ere long, when stimulated by food and the force of the wind, one would mount into the air ten or fifteen feet, and with talons well down float or soar for a full minute; and the stronger the

wind the higher they would seem to go. We said "good-bye" to them more than once, not knowing then the long practice the young eagle needs to acquire that perfect coordination of muscles and nerves which will give him confidence in the air. At such times they will also seize a stick and bear it aloft in their talons precisely as later on they will treat their prey. To our surprise they actually remained in the nest two weeks longer, and so slow was confidence in their powers acquired that the old eagles had to finally starve them out. On July 1 of that year the eagles changed their tactics; they began to reconnoiter the nest, circling about it and showing a fish but not delivering it. After a fast of twenty-four hours eaglet number one was thus enticed away, at noon on the third of July, while the more patriotic of the two held out seventeen hours longer, or until fifteen minutes after five on the morning of the Fourth. At that time one of the old birds came screaming to the eyrie and carrying a fish; as it circled the nest, drawing nearer and nearer, the remaining eaglet, now frantic with hunger, began flapping and screaming in good regulation style. Finally, as the old bird hovered directly over the nest and was drawing away, the screaming eaglet launched into the air, and, following its parent with the fish still in its talons, made a good mile in its first flight, landing in the top of a dead tree to the eastward of the grove.

PRACTICE OF STRIKING PREY AND LIFTING IT FROM THE GROUND

The eaglet has seized a stick and is flapping in an attempt to rise with it in the air; later he will succeed and bear the stick aloft five or ten feet, as he will later carry a fish in his talons.

In the next year, 1923, two important changes occurred in the eagles' tree; in the spring the foliage had failed to develop, so that the whole top of nest-tree was bare, and during the previous summer we had removed certain obstructing branches, particularly those on a stub which rose four or five feet from the center of the north side of the nest. This last seemingly trifling act altered in some important ways the whole tenor of life at the nest, for that stub was now adopted first by the old eagles and then by their young as a nest-perch. This year an old bird, after having fed its young, would hop on this stub and apparently derive the same satisfaction it formerly received in going to any of its perches a thousand feet away. The observer thus enjoyed the advantage of having at least one of the old eagles before his eyes for hours at a time. If the female happened to occupy this perch of watchful waiting, the male might land on the eyrie, and we would have the whole eagle family, as it were, at dinner—four eagles, all more or less in action—two white-heads, and two in brown juvenal dress, now almost full size.

We never tired of watching the old eagles when on the nest-perch, where with the glasses we could study their every movement, even to the flicker of their third eyelid across the surface of their yellow piercing eyes—seldom exceeding twenty to the minute, as in the young. Never for a moment off their guard, and alive to every moving object within the range of their vision, they would make their toilet, stretch their wings, gape, yawn or scratch their heads, thus showing us the pattern on which the same movements in the young have been so perfectly modeled by heredity; they would sometimes drop down to the eyrie and, after feeding for a time, return to their post. On some days they seemed to regard our observatory with suspicion, but on others gave it no heed, and on one occasion, when the female had spent three hours on the nest-perch and was apparently camped there for the night, she had to be driven off in order to permit the observer to depart for his supper. I have seen an old eagle stand upon its perch, without lifting a foot or changing the position of its body, for a full hour,

but its eyes were never still, and its head, turning each way in a half-circle, permitted no moving object to enter its field of vision unobserved.

This year there was no luring of the young from their eyrie, no starving them out, and the larder was well stocked up to the last day, when they had chicken for breakfast, and two large sheepsheads and two smaller fish were served some hours later. The first eaglet left the nest at 10.35 a. m., June 27, an instant after I had photographed him, as he rose in the air; to my great pleasure and surprise he came back two days later, screaming, and remained twenty-seven hours. He stayed, I believe, because he had enough to eat and because he received the same satisfaction in going to the stub over the nest as from a longer flight; this satisfaction, it would seem, was shared by his parents also. At the moment of his return eaglet number two reacted towards him as if were an old bird bringing food, squealing, bristling and holding up his bill to be fed. Strangely enough, a little later when eaglet number two dropped back to the nest from the stub, whither it had gone to preen and stretch, the first bird reacted to it in turn in the same way.

LAST DAY OF LIFE IN THE EYRIE

Gingerly picking at a sheepshead which was brought to the nest fifteen minutes before, and showing no signs of hunger. In 1922 the young were starved out, but in 1923 were given food in abundance and allowed to bide their time, owing probably to their use of the stub at the back of nest as a perch.

FINAL STAGE IN FLYING PRACTICE

The young eagle rising above the eyrie under its own power; photographed at 7:55 A. M., June 26; 27 hours later this eaglet left the eyrie and was gone two days.

On June 30, the last day of life at the nest during the present year, the eaglets circulated freely between nest and nest-perch, and when on the stub their responses to a parent coming with food were most interesting to see, since the necessity of maintaining their balance somewhat interfered with the free play of their instincts. Eaglet number one finally left the eyrie on the afternoon after ten weeks and two days of nest-life; while the last to go at 5.15 on the morning of July 1 had passed seventy-four days, without a break, in its tree-home. If the importance which I have attributed to the presence of a nest-perch is justified, it would only confirm what we already know of the effect upon behavior which even a slight change in the environment may sometimes entail.

The Gentle Wood-Pussy

By WILLIAM L. AND IRENE FINLEY

Of the National Association of Audubon Societies

(PHOTOGRAPHS BY THE AUTHORS)

WE WERE standing on the hill at the side of our house overlooking the Willamette River. The round October moon was a sure sign that animals were on the hunt and growing fat and furry for the winter. The long fir branches swayed, and there was a stir among the maple leaves. I threw my nostrils to the wind. The message came in an unmistakable odor. It was not unpleasant. It never is in the open field or here on the slope above the river.

Last week my neighbor passed by and told me we had better block up the hole under our chicken yard fence. He, too, had read the signs in the wind and was sure a skunk was in the neighborhood. He is of farmer stock. He says he loves nature. Occasionally when I go over, I have noticed he takes great pride in his pigs, especially if the market report records a rise in pork. He says no song thrills him like the cackle of his hens when eggs are sixty cents a dozen. He is the kind that kills skunks.

THE SIGN OF DANGER

When a skunk begins to elevate his tail and prance with his front feet, it is a warning to keep away.

I am a naturalist living among practical farmer folks. I gladly settle in cherries for the songs of the robins. However, I am not selling cherries for a living. I, of course, have time to hear the whistle of the mountain quail and the melody in a meadowlark's song. I keep a cow and chickens. I have a vegetable garden. But a large part of our ten acres is uncultivated. We have tried to keep some of the wild flavor in this tame patch of woods about our farm. For this reason, I was in hopes a wood-pussy might some day take up a homestead on our wooded hillside.

At first I thought I would let my neighbor read about the true life of the skunk. But he might not understand. "Feeble, almost defenseless," said my natural history. Almost! But not quite. Poor little wood-pussy! He cannot run very fast. In the face of danger, he just stamps his feet, humps his back like a pinched wasp and turns his tail. I would send for government reports on the economic value of skunks and skunk farming. These might enlighten my neighbors.

Just about a week after we stood on the side hill and received this message broadcasted on the breeze, we were sitting at the evening meal. I had fed the chickens, milked the cow and piled the woodbox high. We had a new animal book to read. Suddenly, Buck, our dog, broke forth on the back porch. I jumped to call him off. As the door flew open, I took in the whole story at a breath. I slammed it shut. The dog had fallen silent.

I went out the side door. My neighbor was coming up the hill from the spring. His first question was superfluous, because anyone could tell there was a skunk in the immediate neighborhood. It was a half-grown wood-pussy and he was bobbing peacefully along the path toward the orchard. He had perhaps lost his mother. My neighbor grabbed a club and was after him.

"Don't kill him!" I yelled. "He's just a kitten! He's likely been hunting mice and grubs."

"And chickens, too!" exclaimed my neighbor, who was persistent in his prejudice. There was no question that he was short-sighted when it came to skunks.

"Let's capture him," I suggested.

"Not if I know it!" returned my neighbor.

I left my neighbor to watch while I ran to the house. The handiest thing I could find was a washtub. When I returned the little wood-pussy was swinging around, stamping his feet, and had backed

my big brawny neighbor out into the middle of the orchard.

It took some maneuvering, but we finally had the pussy under the tub. I had promised my neighbor I would not let him go where he might find the way to his chicken house. I wanted to study him and get some pictures. I had a plan in my mind. Across the river is a wild wooded place where old logs are overgrown with vines and bushes and the nearest house is a mile away. I was sure we could take the little skunk across where he would find other skunk friends and no unfriendly farm folks.

WAS HE FRIENDLY OR NOT?

The gentle little wood-pussy on the seat and the boat drifting rapidly down the stream.

The next day a friend happened to come with a camera, so the lady of the house and I carried the tub, covered with boards, down the hill and carefully set it in the bow of the rowboat. As we pushed off from shore, the boat lurched to the left. The tub overbalanced, the boards slipped and the little wood-pussy rolled out.

WHEN HE IS BUSY EATING

The wood-pussy gnawing the meat from a bone. He is holding it with both front paws while he eats.

Poor maligned little animal! The reason animals are wild is because they have been persecuted for so long. Here was at least one case where kindness would rule. I would lift him gently and put him back in the tub. But why scare him? We had swung out into the current and were drifting down stream. The little wood-pussy climbed to the bow. He didn't like the expanse of water. I started to take the oars. He began to back up, swinging his head from side to side. He was in a strange place. He just kept on backing. I stepped toward the stern to give him room.

"Shoo! Shoo!" said the lady. But the gentle wood-pussy just raised his plumed tail in the air. He didn't know anything more about shooing than a mud-turtle does about Sunday. He was now in possession of the middle seat.

"Better get an oar. You are drifting rapidly," called the camera man, who was following along the shore.

"Just remain perfectly calm and don't irritate him," I whispered to the lady.

The gentle little pussy looked over one side of the boat and then the other. The feeling of being hemmed in such a small space with water on both sides was unsettling his disposition. We steadied the boat to keep him from getting seasick. Then he began edging toward the stern. If he wanted sympathy and protection, I couldn't quite make out why he pranced in so excited a manner, first turning his head aft and then toward the bow. My neighbor had told me that

(CONTINUED ON PAGE 186)

Mushrooms, Edible and Otherwise

By L. W. BROWNELL

EVERY year, throughout our woods and fields, there goes to waste a huge harvest of not only edible and nutritious, but very delicious food. A large part of this harvest can be easily gathered and utilized, giving us many a dainty for our table, but, in order to do so with entire safety, we must have some knowledge concerning it. This is not difficult to acquire.

Many varieties of mushrooms are not only just as edible as, but much finer flavored than, the two or three species that are commonly grown and gathered for the market. There are also some that are poisonous, a few of them deadly. These we must know beyond any doubt before we can, with even comparative safety, use any of this wild harvest for the table.

That for many centuries certain mushrooms have been highly prized as articles of food by the epicures is evident from the statements of early authors. Especially is this true of the Romans. One species, in particular, was held by them in such high esteem that it was called, and still is, "Caesar's Mush-

UPPER

THE PUFF-BALL

Everyone who goes into the woods knows this puff-ball, Scleroderma vulgari, which is edible, although it does not have as fine a flavor as some of the others.

MIDDLE LEFT

SLIGHTLY POISONOUS

The growth is frequently seen and should not be confused with the good mushroom. It is the Russula virescens.

LOWER

ONE OF THOSE COMMONLY GROWN FOR MARKET

The Agaricus sodmanni is one of the most familiar of the edible mushrooms.

THIS SHOULD NOT BE TOUCHED

The Amanita rubescens is among the mushrooms classed as doubtfully edible and should not be picked and eaten.

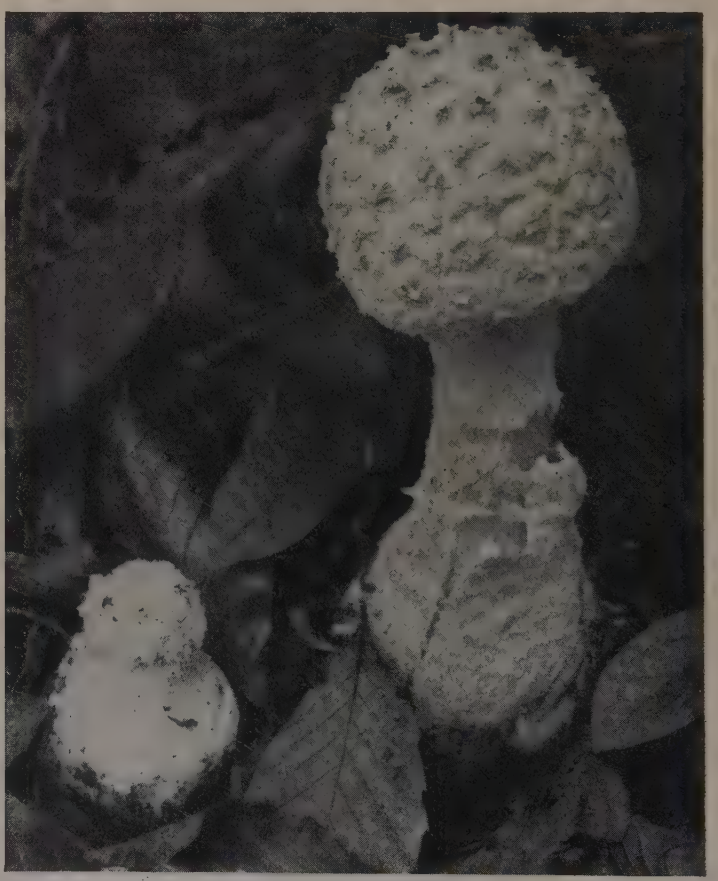
room." Strange as it may seem, this delightfully flavored species is the only really edible one of a large family that harbors the really deadly members of the race. For this reason no one should attempt to eat it unless he knows it beyond any possible shadow of doubt, for it closely resembles one of the deadly ones, the fly amanita (Amanita muscaria). While, by many, these plants have been esteemed as articles of food, the following from Shelley's "Sensitive Plant" is evidence that by many others they were held in utmost abhorrence and disgust, and were frequently used as the emblem of all that was uncanny and grewsome:

"And agarics and fungi, with mildew and mold,
Started like mist from the wet ground cold;
Pale, fleshy, as if the decaying dead
With a spirit of growth had been animated."

What is a mushroom? It is one of a class that belongs to a great order of vegetation known as fungi. To this order belong not only the mushrooms, but also the mildews and molds that come on our clothing and food, the rusts and smuts that occur on other vegetables, and the dry rot that destroys our lumber. Fungi are unique in their relation to

DO NOT EAT THIS

Readily distinguished by its shaggy mane this mushroom should be carefully left alone.



DOUBTFULLY EDIBLE

This species of mushroom, the Amanita solitaria, should not be picked by the novice.

the rest of the vegetable world. They are plants that prey upon living or dead organic matter. They bear no flowers, and, therefore, produce no seeds. They are entirely devoid of chlorophyll, the agent which gives to other plants their green color and the only agent in the world which has the power to turn lifeless mineral substance into living matter. They do not grow from seeds, but reproduce their species by means of fine, dust-like bodies called spores, which may be seen rising like brown dust from a puff-ball when it is squeezed. They come in many and varied forms, often brilliantly colored and quite beautiful, but the shape that is commonest and most generally known is that of the agaric that is grown for use on the table.

A MASS OF GOOD FOOD

This is a well-known honey-colored mushroom, the Armillaria mellea, which is excellent to eat and is much desired by those who like mushrooms.

Many people differentiate between what they term "mushrooms" and "toadstools," the former being considered edible and the latter not. In point of fact this is a distinction without a difference and has no scientific basis. In reality, many of the forms commonly classed as "toadstools" are edible, and some of those placed among the "mushrooms" are poisonous.

There are many species of the edible varieties whose characteristics are so pronounced and unmistakable that any one, with but a small knowledge of these plants, can easily learn to know and gather and to eat them with safety. Also there are many of the dangerous species that are just as easily recognized, and these we should learn to know in order to avoid them.

THE DELICIOUS MOREL

The Morchella esculenta, one of our finest mushrooms, has a shape that cannot be readily mistaken for any other.

Especially is this true of the genus Amanita, some of the members of which are the most deadly known. As one authority has stated, it would be less risky to thrust the unprotected hand into a den of rattlesnakes than to eat the smallest amount of one of the more poisonous species of this genus. As I have said, however, all the members of this genus may be readily recognized and so avoided. They all have a bulbous base to their stems, and this is usually encased in a loose, cup-like sheath called a

volva. Also, somewhere on the stem is a membranous ring, more pronounced in some than in others, but always present, called an annulus. While other mushrooms have one or the other of these characteristics, no others have them both. Therefore, it is well for the novice to avoid all forms having a swollen base to the stem in a cup-like envelope, and having a ring on the stem, especially if the gills are white.

The different species of the genus Morchella, the Morels, are the earliest to appear in the spring. They may be found in late April and early May. They are all easily recognizable, and the best description that can be given of them is the accompanying photograph of the commonest. They are all very similar in appearance, with the characteristically reticulated surface, and are all of them edible, some of a very delightful flavor. Indeed, the one figured in the photograph is called the "delicious morel" because of its excellence.

THIS MAY BE EATEN

Not difficult to distinguish from the others, on account of its structure, the Coprinus micaceoyus is perfectly safe to eat.

The puff-balls, or stemless mushrooms, those fungi with which we are all more or less familiar from having stepped upon them as children to see the "smoke" puff out, are all of them edible and most of them excellent articles of food. The "smoke" is the mass of spores, each individual one much smaller than can be seen by the naked eye, which are borne inside the plant and puffed out through an aperture in the top at the least pressure. These plants must be used, of course, before they have matured, while they are yet firm and the inside white, with a cheesy consistency. Then, if peeled, cut into thin slices and fried in butter, they are really delicious.

YELLOW OR ORANGE IN COLOR

These characteristics make the Jack O'Lantern, Clitocybe illudens, quite easily recognizable. It is poisonous and should not be picked.

Another family of mushrooms of which none are poisonous and some very palatable, are the coral fungi. All of the members of this family are easily recognizable from their many-branched, coral-like growth. Many of them are extremely beautiful in form and coloring, the latter being in many shades of pink, violet, lavender, orange and yellow, as well as pure white. Many

MANY MEALS HERE

This is the Pleurotus almasius, a fungus growing on tree trunks, which is really good eating.

DEADLY POISON

This common form can be distinguished by the bulbous base. It is the Destroying Angel.

THE DEATH CUP

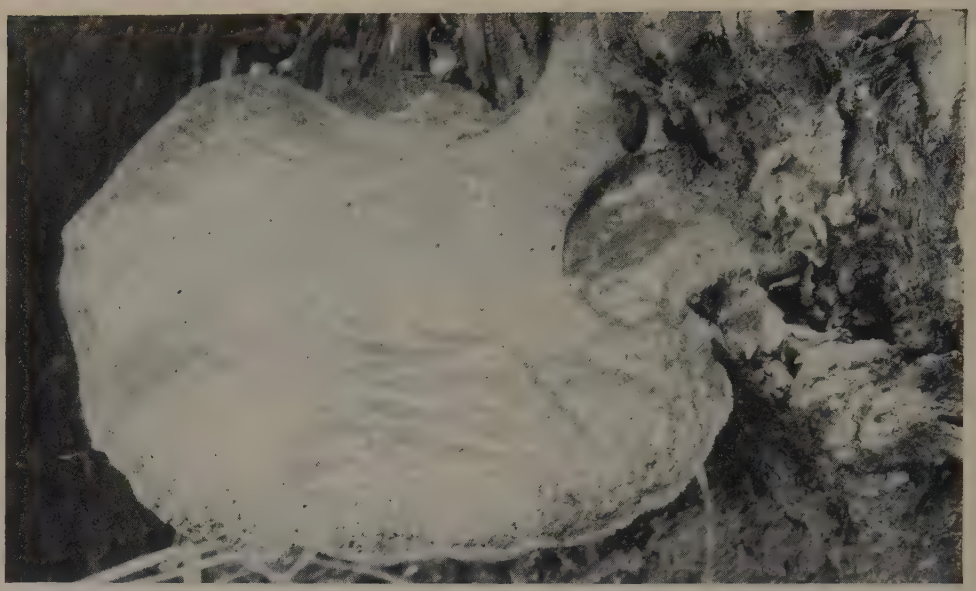
The name alone of the Amanita phallioides is sufficient warning of its deadly character.

BEAUTIFUL AND FINE EATING

This coral fungus, Clavaria ansea, of the mushroom family is considered a delicacy.

forms grow in considerable masses from dead tree trunks or old logs, one such mass frequently being enough to form a meal of such size that it will provide for several people.

The genus Coprinus is another one of which the members are all readily recognizable, and any of them may be picked with perfect safety for the table by the amateur mushroom hunter. These are the "ink caps," so-called because soon after the spores mature the entire cap deliquesces into an inky mass. Of them Shelley wrote in another stanza of the "Sensitive Plant":



UPPER

THE BEEFSTEAK MUSHROOM

This, the Fistulina hepatica, is a lurid red when mature. It oftens grows to a weight of several pounds and is highly esteemed as a delicious article of food.

MIDDLE LEFT

ENOUGH FOOD FOR THE WHOLE FAMILY

This fungus, which is good eating, grows in masses on dead or fallen tree trunks and branches. It is the Lycoperdon pyriforme.

LOWER

EATING THIS IS SUICIDAL

This is the fly amanita, Amanita muscaria, which is among the most poisonous of the mushrooms.

"Their mass rotted off them flake by flake,
Till the thick stalk stuck like a murderer's stake,
Where rags of loose flesh yet tremble on high,
Infecting the winds that wander by."

Nevertheless, these plants, if gathered young, while the undersides of the caps, or the spore plates, are still white, make delicious eating. We must search for them, however, in the early morning if we would find them in the proper condition, for they are literally plants of a day, springing up in a night, and, before another night has come around, having melted into a black, sticky, unsightly mass. Many of them grow in large

masses from decaying tree trunks and are so crowded together that the individual shape is entirely lost. There are frequently one hundred or more of these plants in a single group.

The plants of the genus Pleurotus are none of them poisonous and may all be picked and eaten without fear. They are easily distinguishable from the other gill-bearing fungi by the fact that they grow crowded together in masses from dead or fallen tree trunks or branches, and their stems are attached to the cap at some point at one side of the center, or are entirely wanting. All of them are white or faintly tinted with yellow, brown or lilac.

LEAVE THIS ONE ALONE

Readily distinguished because of its shape, the Amanita strobiliformis is not safe to eat, and is to be strictly avoided.

Of the so-called "bracket fungi," those shelf-like species that project from the standing trunks of trees either partially or wholly dead, there is one that we may all know from its characteristics and which has an international reputation for its delicious qualities. This is Fistulina hepatica, known commonly as the "beefsteak mushroom" or "beef tongue." In color it is a livid red when mature. When young it is of a more yellowish red and its upper surface is velvety. Its flesh is red and fibrous, giving it much the appearance, when cut, of beefsteak, from which it derives its name. It often grows to a considerable size, frequently weighing several pounds.

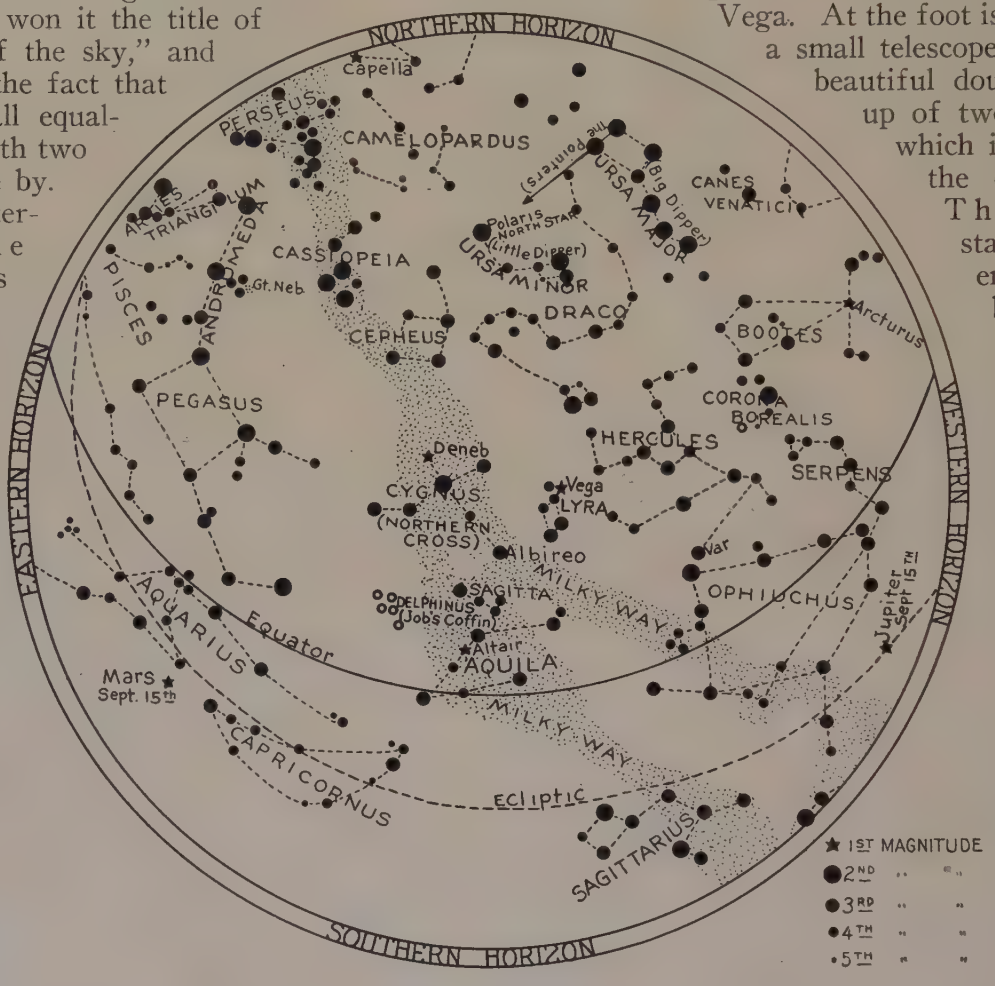
In the genus Armillaria there are several finely flavored species. The most conspicuous of them is the "honey-colored mushroom" (Armillaria mellea) that grows in large clumps at the foot of old stumps and is frequently a menace to living trees. A feature of this mushroom is that one can hardly mistake it for any other species from its color and method of growth.

There are, of course, many species of edible mushrooms other than those I have mentioned, but the majority of them are not easily distinguishable, except by experts, from some that are either actively poisonous or else not entirely fitted for food. Therefore, the amateur would do well to confine his attention to those species that he can recognize beyond any doubt. If he searches only for those that I have enumerated as being desirable he will be entirely safe and will find that these will furnish him with tidbits for his table all summer and well into the fall of the year.

The Evening Skies in September

By ISABEL M. LEWIS

IN SEPTEMBER two interesting constellations are found directly overhead in the early evening hours, Cygnus, The Swan, which contains the well-known Northern Cross and Lyra, The Lyre or Harp, with its brilliant Vega, one of the finest stars in the heavens. It is always easy to identify Vega, first because of its dazzling bluish-white light which has won it the title of "the arc-light of the sky," and secondly, from the fact that it makes a small equal-sided triangle with two small stars close by. It might be interesting, by the way, to test one's eyesight on the more northerly of these two faint stars which a keen eye will separate into two stars without the aid of a telescope. This star is called Epsilon Lyrae, and it is a fine example of a quadruple star—that is, a star made up of four stars. A very sharp eye will see two stars where most of us see but one, and with the aid of a small telescope each of these can in turn be split up into two stars, making a system of four stars all revolving about a common center.



Vega is one of our nearer stellar neighbors. Its distance from the earth is twenty-five light years, one hundred and fifty trillion miles. That is, a ray of light from this star will take twenty-five years to reach the earth, though it travels with the speed of lightning which would take it nearly seven times around the earth in a second. One may judge how great is the distance to even the nearest stars from the fact that Vega, a near stellar neighbor, is about one and a half million times more distant than the sun, which is our own particular sun, the one about which our earth revolves. Directly to the east of Vega in the path of the Milky Way we find the Northern Cross. At the top of the Cross is Deneb, one of the twenty brightest stars in the heavens and a giant sun, far more distant than Vega. At the foot is Albireo, which a small telescope shows to be a beautiful double star, made up of two stars, one of which is gold in color, the other blue. There are many stars in the heavens that are double—that is, made up of stars revolving around one another—and most of these pairs are of contrasting colors, one blue and the other gold, or one red and the other green. Albireo is considered to be one of the finest of the pairs that are visible in small telescopes.

The Northern Cross is not as beautiful an object as the famous Southern Cross, which cannot be seen in our latitudes. One must go as far south as Cuba to see the Southern Cross, and even there it cannot be seen under as favorable circumstances as in South America, South Africa or Australia. Like the Northern Cross it appears against a brilliant background of the Milky Way, but it is more conspicuous than our Northern Cross because it is more compact and brighter. Many of the early explorers in South America considered the Southern Cross as a sign of God's approval of their conquest of the New World and referred frequently to South

(CONTINUED ON PAGE 187)

WOMEN MAKING CIGARS IN A MANILA FACTORY

Here the cigars are made by hand, while in some manufactories in the United States machines are used for part of the process of making them.

Tobacco—The Plant of Peace

By RICHARD W. WESTWOOD

GRAVELY old Chief Kinnewaska stuffed the brown powder into the long-stemmed pipe, whose wooden bowl was carved as the head of a buffalo, the sign of his roving tribe. Ceremoniously the grim chieftain drew a burning stick from the fire and laid its glowing tip across the bowl. An intake of breath, and he puffed out a cloud of fragrant smoke. Reflectively he puffed again, his shrewd eyes seeming to review the warring exploits of his tribe against the men of the three other red chiefs, whose strong, wrinkled faces stood out in the firelight.

Chief Kinnewaska passed the pipe to the right. Chief Winnewaha, with the gravity of a leader who makes peace but never surrenders, accepted it and sent from his lips a cloud of smoke in sign of amity. Then Chief Madanaska and Chief Namanak smoked in turn. A few moments they all sat in silence, the trembling embers shooting quick shadows about them. Finally Kinnewaska rose, drawing his blanket proudly about him. His visitors rose as well. Without waste of words they made the ceremony of departure. In the ornamented pipe they had smoked the powdered leaves of the plant their squaws cultivated, and peace reigned for a time between the four tribes.

When Columbus chanced upon the "New World" he found that there prevailed a strange custom of smoking. In pipes or in rolls of leaves, the brick-colored natives of the new land were putting to a

curious use this plant, which they had greatly developed and which bore relation to the tomato, potato, eggplant and jimson weed. Other explorers, landing in Mexico and in Central America, found this odd practice, and Cartier discovered the northern Indians drying the leaves of the plant in the sun. In Haiti the natives used a tube for smoking and taking snuff, calling it by the native name of "tabaco" and giving the Spaniards the word that is now written with only slight variation in nearly every living language.

Tobacco, then, is typically American. The world did not know it until man had braved the unknown oceans and found a new hemisphere. It was rapidly spread by traders and travelers, finding favor in the four corners of the world, first as a novelty and fad and then as a wide practice as among the redskin tribes of wild America. Whether or not this was a benefit to mankind is often debated, particularly around New Year's Day, but in any event tobacco ranks high among the gifts of Nature that man has cultivated with an economic profit.

Taking its common name from a handy word in the Haitian tongue, tobacco adopted its plant name from a European source. Threvet, the French explorer, had found the plant in Brazil, taking it to France in 1556. It failed to arouse much enthusiasm until one day Jean Nicot, the French ambassador at the court of Portugal, distinguished his diplomatic career by making the use of tobacco the vogue in court circles. He also made his family name immortal, for tobacco is known in scientific circles under the name *Nicotiana tabacum*.

MARYLAND TOBACCO
Note the seed pods which are full grown.

TOBACCO WAREHOUSE IN THE PHILIPPINES
In the United States wooden barns well aired are numerous in the tobacco-growing sections.

Regarded for a time as a potion equipped to cure everything mentioned in the patent medicine advertisements, tobacco was not cultivated in Europe until the early seventeenth century. From then on its popularity increased and its growing extended to several Asiatic countries. In America, John Rolfe, of the colony at Jamestown, Va., had brought some West Indian tobacco seed for cultivation. By 1619 he had a crop large enough for a shipment of 20,000 pounds to England, the foundation of an immense agriculture and trade.

Maryland was the next colony to carry on the extensive culture of tobacco. The Revolution found these two early tobacco producing centers with an annual export of about one hundred thousand pounds. The war over, this crop came to have a more widespread economic importance in the new country. Its production spread with settlement, until today it is an important crop in fifteen states, the most westerly of which is Wisconsin. More than one billion pounds a year are produced in the United States.

Tobacco can be grown with success in climates ranging from that of the south of Canada to the heat of the Tropics. It is sensitive as a plant, however. Climate and soil govern its quality and quantity perhaps more than they do any other field crop. But the fundamentals of its cultivation were developed in the early days of colonial America, and, although many details have been improved, they are generally the same today.

Not unlike the

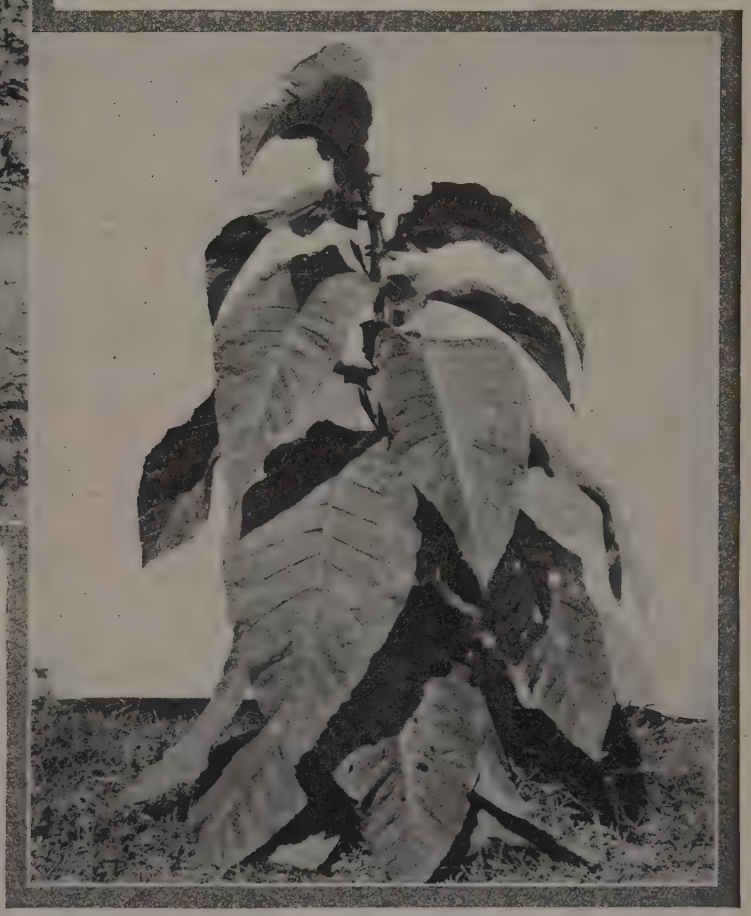
PHILIPPINE TOBACCO CART

Crude conveyances are still used in the cultivation and marketing of tobacco in the Philippines.

people of our country with their differences of accent, tobacco has local and sectional characteristics. While most of the commercially important tobaccos are descended from one parent plant—a coarse and luxuriantly growing species of from three to six feet in height, with large leaves—there are many varieties and subvarieties with descriptive and interesting names. They vary in the size, texture and numbers of their leaves. In tobacco-growing and manufacturing circles they are usually known for their use, whether they are to be made into cigars, to be exported or to be manufactured into various kinds of tobacco.

The leaves of the tobacco plant are fixed alternately on the main stalk and they range from egg-shape to lance-like. Some have wavy margins. The midrib of the leaf may be heavy and prominent in one kind, and weak and inconspicuous in other varieties. In still others the base of the leaf joins the stalk. Little open cells, the lungs of the plant, occur on both sides of the leaves, and the green parts of the plant are covered with fine little hairs. The flower of the tobacco plant is large, with beautiful shades ranging from a deep red to a light pink, and is rich in seed. The tobacco seed is very small to grow such a large plant, and there are more than 300,000 seeds to an ounce.

From the time the tobacco seed is sown in the transplant bed until it is transformed into a mellow cigar, it receives much tender care. Depending upon the climate, the seeds are set out in beds of rich soil in cold frame or hotbed. In a month and one-half to two months and one-half, the seedlings will have attained a hand-



TOBACCO PLANT

Note the breadth and length of the leaves and how sturdy the plant appears.

high stature. They can then undergo the transplanting to the field, although usually they are given a week to become accustomed to the sunlight and air, the cheesecloth cover that is frequently kept over the young plants being removed long enough to get them in training.

Transplanting results in numerous casualties among the youthful plants. If they are set out with plenty of water and packed in to stand erect, they face this stage of life with a fair chance. Often the tobacco field becomes a sea of cheesecloth stretched man-high above the newcomers until they

are hardy enough to stand the heat of the sun and the battering of the rain drops. A sharp watch must be kept for the cutworm enemy, and the young plants that have not been able to survive the ordeal of transplanting must be weeded out.

Until the spreading leaves of the plant have reached out too far, the soil is cultivated in a shallow way and kept clean of weeds. While it is growing the young leaf is a rich dark green. It is taking into its leafy system the plant food necessary to make it large and strong. Finally the ability of the leaf to manufacture food supply has about reached a limit. The elements of the food supply then go through the stalk and set to work to build the flower head. Except for the development of seed plants, the tobacco farmer prevents this by "topping." He removes the seed head and checks the seed growth.

Thwarted thus by man, the tobacco plant makes another try to reproduce itself. It sends out secondary shoots known as suckers, but again the farmer steps in and removes these. In this way the food is kept in the leaves, giving them both greater size and thickness.

Having been unsuccessful in two attempts at reproduction, the plant now allows an excess food supply to arise in the leaves. This is largely starchy and gradually the leaf shades out into lighter green. It is flecked with lighter tints, a sign of ripeness, and is brittle in the fingers. It has come time to harvest.

The methods and times of topping, the period of harvesting and many other of the details of care and cultivation, necessarily vary for the different plants. They are governed both by climate and by the purpose to which the leaf is to be put. In their essentials, however, they are very similar.

SEED LEAF OF TOBACCO FIELDS

This is grown in Lancaster County, Pennsylvania, famous for its tobacco crops.

The leaves are usually harvested either by cutting the stalk or stripping from it. They are hooked or hung, properly spaced, on a lath or other special stick for the curing process. The leaf is not dead when it is harvested. It is, in fact, very much alive and must pass through a period of gradual starvation. Sudden death is fatal, and the bruised, frozen or too rapidly dried leaf cannot be properly cured.

There are various methods of curing, depending largely upon the use to which the tobacco is to be put, and this is one of the most important chapters in the life history of a cigar or pipeful of tobacco. First, the green leaf is starved out to a yellow, removing the starch and other properties in the food supply. Once the cells of the leaf are dead, the second stage of curing takes place, turning the leaf into a brown or red hue. In the first stage extremely low or high temperatures are used to kill the leaf, and the water is extracted gradually. That the leaf has really starved may be seen in the fact that it has lost about three-quarters of the weight that it had when a flourishing green leaf.

FIRST AND THIRD QUALITY OF TOBACCO

Note the difference in the length of the leaf of first quality tobacco in the center.

Just as the episodes in the life of the living tobacco plant vary in localities and in varieties, so do the processes of curing and treatment vary. It is these variations that give the finally

(CONTINUED ON PAGE 186)

The Catbirds in the Orchard

By HOWARD TAYLOR MIDDLETON

(PHOTOGRAPHS BY THE AUTHOR)

Three hungry babies with the middle one openly indicating the fact.

Tragedy and comedy expressed by the faces of the two young catbirds on the right.

Daddy Catbird on his way home with a worm for this family.

WITHIN the shadowy precincts of the same old orchard where Screecher, the tremolo trumpeter of birdland, has his rural dwelling, we found three nests of the slate-grey catbird. There were brush piles, products of a long-ago pruning time, and blackberry briers beneath several of the trees, and there it was that the feathered Quakers did their housekeeping. As a home was discovered, a battered kettle or some such cast-off utensil was salvaged from a dump and placed on a pole top in front of the nest. This was to accustom the birds to an object at close range, so that when camera and tripod were substituted for kettle and pole, they would not cause undue excitement.

When the real business of catbird photography began a few days later, the Premo long-focus instrument was set up before a circlet of twigs, grasses, leaves and roots, and focused with greatest care. As the morning sunshine filtered through myriads of apple leaves ere falling into the lap of our studio, we realized the possibilities of unusual lighting effects. What we most desired was a photograph of a catbird at the nest, with dappled sunlight adding a fascination and novelty to the scene. In order that there might be no obstructing out-of-focus foliage to mar the artistry of our pictorial setting, we bent back all the disturbing blackberry vines, and, with a single exception, tied them in that position with twine. We adjusted one branch, however, in such a manner that it could be moved back and forth above the nest, thus regulating the amount of light. It was hot weather and therefore necessary to protect the brooding bird and her eggs from sun glare except at the instant of portraiture. (Never cut the protective surroundings away from a nest, but so arrange the studio that, when your work is done, you are able to leave things exactly as you found them. This shelter is not only to de-

JUST HATCHING

Both babies and eggs are visible in this catbird's nest sheltered within the prickly heart of a brier thicket.

fend the birds from the heat, but to camouflage them against attack from prowlers in fur and feather.) One thread attached to the above-mentioned branch, and another to camera shutter lever, led to our control station beneath a nearby apple tree.

When Lady Catbird, who had retreated in high dudgeon at our first approach, returned to her four blue jewels in their rustic casket, the branch thread was gently pulled, moving the spray of blackberry just enough to send splashes of sunshine athwart her back, tail, and feet, and throwing out her head and breast in soft relief. Then the shutter thread was pulled likewise, giving us the sort of unusual bust portrait we wished for.

By using super-speed film, such a picture may be successfully made in the shade with a Rapid Rectilinear lens, which is much slower than an Anastigmat—and cheaper too, of course—at a shutter speed of one twenty-fifth second, provided the feathered "sitter" does not indulge in a quick movement at the moment of exposure.

Trying out this same experiment at another nest, we found, upon developing the negative, that a sunshine bath had transformed our Quaker lady's sober grey into raiment of snowy-white, the resultant print showing a color phase strongly suggesting the albino.

Among the most valuable of trophies in bird photography is the ensemble portrait. While the parent birds usually perform an equal part in bringing nourishment to their children, it is rarely indeed that they both appear at the nest simultaneously. Notwithstanding this handicap, it is quite possible for any patient camera man to obtain such pictures from a bird family.

Never attempt to photograph bird babies, I pray you, until they are sufficiently sturdy to be taken from the nest without harm. The best time for juvenile portraiture in catbird land is just prior to the breaking of home ties, when the youngsters are fully feathered and

APPROACHING WITH THE LUNCH, DELIVERING IT AND DEPARTING WITHOUT ALIGHTING

An unusual picture of a mother catbird with a cherry in her beak, flying to feed one of three hungry babies. Note the awakening interest in the two babies and their angry protest of disappointment.

AN "ALBINO" CATBIRD?

No, a sunbath is responsible for the apparently snowy garb of this Quaker bird lady.

about to fly. If you have been near the family almost constantly during the nesting period, they will very likely lose all fear and accept you as a friend. When this glorious event transpires you may employ the outstretched hand of a comrade of the wild life trails as a studio, as Pal (Mrs. Author) and I have done, thereby experiencing the thrill that comes from a wild bird feeding luscious cherries to her young in the most unique of all dining-rooms.

DINNER READY

A mother bringing a fuzzy caterpillar to her hungry brood.

THE WHOLE FAMILY

Mother, father and children, all posing for their photograph.

MID DAPPLED SUNSHINE

A moving spray of blackberry vine above the nest controlled the leaf-filtered sunshine.

For close-up action pictures such as these, a shutter speed of one one-thousandth second and a fast wide-open lens are imperative. Taking it for granted the proper camera is in use, it will also be necessary for the operator to be ever on the alert for the photographic moment, always considering the fact that the order "Fire!" must be relayed from eye to brain, and from brain to shutter lever finger. In other words, "shoot" a bit ahead of the flying bird if you would score a hit.

L'envoi.—If, after reading my little story, you who have hitherto slain birds with a gun, will indulge *just once* in camera wing-shooting, I have no fear of the outcome. There will surely be one killer less and one true sportsman more for every experiment made in this department of nature photography. Compare an action portrait of a living bird with a bunch of bloody feathers and you will never shoot—except with a camera.

THIS FOUR-FOOT ANIMAL LIVES ON TERMITES

Great Anteater, or Ant Bear, as he is called, tears open the earthy nests of its prey and consumes the insects as they rush to the surface.

The Great Anteater

By EDWARD A. PREBLE

THE GREAT anteater (*Myrmecophaga tridactyla*), sometimes called the ant bear, is upwards of four feet in length, besides the tail, which measures about three feet. It has an extensive distribution in the warmer parts of Central and South America. It lives in the depths of the humid forests and swamps, but seems to be nowhere common. Its food consists mainly of termites, commonly miscalled ants, in allusion to which habit it received its generic name. Its fore limbs are powerful and armed with very strong and sharp claws, which enables it to open the earthy nests of its prey. The termites, alarmed by the destruction of their dwelling, swarm to repair the break, and are drawn into the mouth of the animal in great numbers by means of its long flexible tongue, which is provided with a glutinous saliva secreted by glands at its base. The animal can defend itself with some effect against many of its four-footed enemies, but it is easily dispatched with a stick, and this comparative helplessness, and the fact that it bears a single young one, probably accounts for its scarcity. The prevailing color of the long coarse hair of the Great Anteater is gray, relieved by a broad band of black, with borders of white, which crosses the chest and extends backward over the shoulders to near the middle of the body. The hair is long and coarse, and that on the tail is disposed vertically, giving a compressed shape to that appendage. As in all the anteaters the long curved front claws of this species prevent it from placing its feet flat on the ground as do most terrestrial mammals, and it is forced to walk on the calloused backs of the digits. Most anteaters are arboreal and are thus enabled to make use of these specially adapted claws in climbing, but the great anteater is strictly terrestrial.

The accounts of this animal by some of the early naturalists, being based mainly on fanciful accounts of the natives, and these often misunderstood, abounded in ridiculous statements, but later researches have cleared up some of the doubtful points regarding its life history. It is so rare, however, that some naturalists who have spent years in its haunts have seen only a few individuals.

One of the earliest notices of the "ant bear" was given by Dampier in the account of his voyages published in 1698, and refers to his observations of the animal made about the Gulf of San Blas, Panama. His description of the appearance and habits is very interesting and characteristic.

The Enemy of the Forest

Fires Set by Lightning and the Hand of Careless Man Do Tremendous Destruction to Mature Trees, Young Growth and Seeded Ground in Our Woodlots and Forests Every Year

Fire fighters clearing ground to prevent the spread of an approaching forest fire.

Fire tool boxes, containing tools sufficient to equip 5, 10 and 25 men or more, are placed on a pack mule and stationed throughout the National Forests by the U. S. Forest Service to fight forest fires. This photo shows a ranger and a mule loaded with a fire box which is to be placed in a strategic position in the forest.

LEFT

Night view of a fire in a western forest —note the flames running to the tops of the trees and the utter destruction in the path of the fiery torrent.

RIGHT

Probably the first fire-fighting railroad train ever put into regular service is this, put into service by the Southern Pacific R. R., which is kept in constant readiness to rush to the scenes of the severe forest fires which so often sweep the high Sierras of California. The locomotive, geared for pumping, draws tank cars holding enough water for an hour's continuous work. Note monitor on left front of boiler, just like a fireboat's.

BELOW

Twenty millions of dollars is the annual loss by forest fires in the United States. In addition, approximately 12,500,000 acres of the finest timberlands are now barren, to which total hundreds of thousands of acres are now being added by the 33,000 or more forest fires which occur each year. That is one angle of the destruction wrought by forest fires in the United States.

A torrent of flame sweeping through an eastern forest and defying the efforts of hundreds of men who worked for days before subduing it.

RIGHT

Observation posts are erected at high points by state and national foresters and there watchers keep constant vigil to report forest fires so they can be quickly reached and fought.

BELOW

Such fires as these on remote mountain slopes and valleys, may break out in scores of places following a lightning storm and the forest fire fighter must constantly be on his guard during the fire season to detect them.

Food Worth Fifty Million from Flowers

By CAROLINE B. SHERMAN
U. S. Department of Agriculture

THE MAGNITUDE of the total trade in honey is surprising. Who would guess that our honey crop is worth 50 millions of dollars a year? Valued in terms of recent retail prices that is what our estimated crop of 250 million pounds is worth.

Then, although honey is produced in almost all of our states, and although we have exported more than 10 million pounds during a single year, we import honey from Cuba, Porto Rico and South American countries. Honey moves out of our heavy producing regions, especially California, in carloads. Frequently it is stored in warehouses in large quantities, for although honey is produced during the season of flowers and although the warehouses must be kept at summer heat, it is considered a cold-weather product and finds its best sale during the winter months.

HERE IS THE FOOD—THE SUPPLY OF FLOWERS IS NEAR

The honey crop is two hundred and fifty million pounds a year and is worth fifty million dollars.

Cooperative associations have been formed among beekeepers for the marketing of their honey, and the Federal Department of Agriculture considers the matter so important that it conducts a news service on honey and beeswax in order that definite and reliable information regarding prices and market conditions in both consuming centers and large producing areas may be available to beekeepers and honey shippers. More than 2,000 interested persons request these reports.

Marked improvement in methods of placing honey on the market has taken place in recent years. In liquid honeys adulteration has been largely eliminated, and the blending process has reduced the variations in quality and flavor formerly noted with criticism. Grades have been developed and are now rather generally recognized by the trade. Water White, White, Light Amber, Amber and Dark are those commonly used for liquid honey, while comb honey is sold as No. 1 and No. 2, with sometimes a "Fancy" grade.

Clover, alfalfa, sage, orange and other delectable flavors and aromas can be recognized clearly in both liquid and comb honey and add much to the romance of honey as food. Buckwheat gives a dark, full-bodied, rather acid flavored honey and is popular with many.

Under improved methods, inferior comb honey is gradually disappearing, light-weight sections are seen less frequently than formerly, and fancy stock is increasingly easy to secure. Formerly buyers and dealers often had to regrade and repack all comb honey they received before placing it on the general market, but beekeepers are gradually coming to realize the desirability of offering only a superior product.

Considering the size of the crop, it is surprising to find that the reason of surplus making of honey by bees is very short, rarely exceeding six weeks in any year, although they gather nectar for seven months, from April to October. During the remainder of this season the bees make only a living. Therefore we may say that our busy bees make 50 million dollars worth of honey in six weeks.

It is estimated that all the bees in the United States gather only a small part, probably not over 10 per cent, of the nectar that Nature produces. There are not enough colonies of bees in the "floral area," properly located and properly handled, to

(CONTINUED ON PAGE 188)

Habits of Some Harmful Insects

By FRANCIS B. ATKINSON

THE FEATHERED police force is divided into squads with an air patrol and a ground patrol and so on. The bats help out on the night shift. There's a certain bad citizen that goes about at night robbing orchards that none of the night force seem to be able to catch; excepting perhaps that little policeman with the leather wings, Mr. Bat. The other night men, such as the whippoorwills, don't do it, as far as we know, though we must admit that positive evidence is difficult to secure. These robbers are known as codling moths. One of them is not much bigger than a silver dime, even with its wings spread. Moreover, wearing dull gray as it always does, a codling moth is about as easy to make out, flitting around in the dusk, as a fleck of twilight! Then, in the daylight, when it's at rest with wings closed, even the sharp eyes of a bird can't make out where the dark gray suit ends and the bark begins.

"THE NIGHT POLICEMAN"

The Brown Bat, who does fine service by destroying many harmful insects.

Yet the bats apparently not only catch the codling moth on the wing but may dart down and get them in the very act of robbing the orchard; that is to say, of laying their eggs on the young apples. The worm that hatches from the egg the moth lays, not only eats apples, but pears and quinces. It is better known as the "apple worm" because it does most damage to apples. You can tell the apple worm moth from the many gray millers of about the same size, by a little horse-shoe pattern of bright copper color on the front wing. She lays her eggs in the young apple, and within a week or ten days there's a worm burrowing right into the heart of it.

The worst of it is that this moth keeps flitting from apple to apple and generally lays only one egg on each—bad luck to her and her little horseshoe! Think of it, one whole apple to one little worm! But even that isn't all. This good-for-nothing little worm doesn't eat half of its apple; no, nor a quarter of it. It just eats its way to the core or thereabouts, gets its full growth in three weeks, and eats out through the other side. Then it lets itself down to the ground with a rope which it spins as it goes, much as a spider does, crawls to the trunk of the tree and makes its cocoon under the bark. Then from these cocoons, about the Fourth of July, say, out pop the moths again! Then the lady moths start laying *more* eggs that make more worms, that make more mischief.

There's a reason for this little biography, and that is that by knowing the habits of harmful insects we can do something useful—very useful indeed. The apple-tree tent caterpillars have practically disappeared in certain school districts where the children have been getting after them. The children collected the eggs and the tents in the spring and burned them, and each child was credited for his good service as part of his school work. The eggs are laid in little belts around the slender twigs and are not at all hard to find.

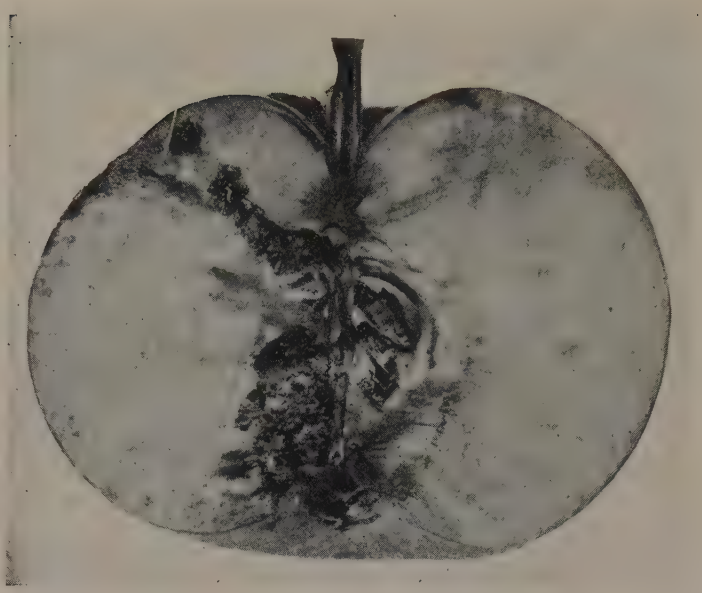
ADULT CODLING MOTH ON AN APPLE LEAF

This insect does great damage to apples and also attacks pears and quinces.

It is the fixed habit of these little Arabs of the tents to come out for their meals on the green leaves almost as regularly as if they went by the clock. They are out for a late breakfast about 10 a. m., for the sun has dried the dew by that time. Then

about the middle of the afternoon they're out again—a kind of afternoon tea. So the early morning and the evening are the times to find them in and do what must be done if we are to have our fair share of the apples.

No bird, so far as anybody has found out, eats the tent caterpillar moth. Although, from the nature of the case, it is not unlikely that some birds do so. Fortunately, however, more than forty species are known to eat either the eggs or the larvæ, which, of course, is nearly as important as the destruction of the adults. Birds are recognized by students of the subject as the most important factor in keeping this destructive insect in check.

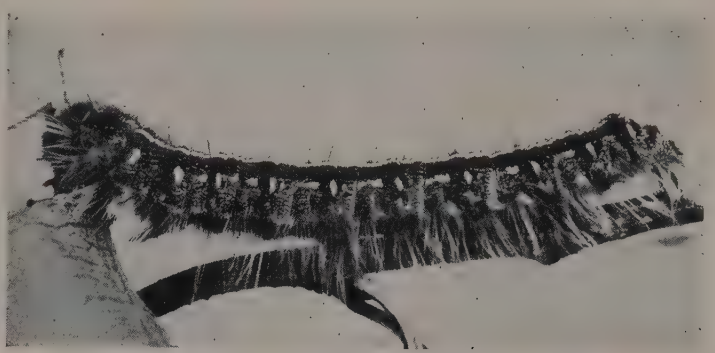


COURTESY U. S. DEPT. OF AGRICULTURE

WORK OF CODLING MOTH ON APPLE

In a few days after the moth lays her egg on the apple, a worm is burrowing to the heart of it.

If you have peach trees, there are the peach-tree borers to be reckoned with. You'll know where they are at work by finding a mass of sawdust and gum on the trees right down near the ground. Cut into the bark with a knife, and at the bottom of these sawdust pits you'll find the borers. You can easily pull them out with a little piece of wire. This and the knife are the tools used for this purpose. If you leave the worms alone, they'll come out as moths the latter part of June, lay eggs on the peach trees—and plum trees, too—and within a week you've got a lot more worms on your hands. These moths, unlike so many other moths, are day fliers and visit flowers for nectar and pollen.



LARVA OF THE TENT CATERPILLAR

COURTESY U. S. DEPT. OF AGRICULTURE

TENT CATERPILLAR, MALE AND FEMALE

Children in some districts conducted such a vigorous campaign against these insects that they entirely disappeared.

Another orchard visitor that is not wanted is the round-headed apple tree borer. You can trace him by his sawdust, especially after a rain. The rain moistens the tree and makes it easier and pleasanter to eat, I suppose—like milk toast. This worm is the larva of a beetle.

Another beetle enemy, not only of apples but of pears, plums and peaches, is the *flat-headed* apple tree borer. You will find Mrs. Beetle herself busy early in June and through the summer, laying her eggs. She's a pretty little thing. You'd think she was all dressed up for a fancy dress ball with her shining coat of greenish-black with two rows of yellow spots, like brass buttons, down the back. But unfortunately she isn't going to any fancy dress ball. She's as busy as she can be running about right in the hot sun, laying tiny yellow eggs under the scales and in the cracks of the bark.

You know how the fruit growers have got into the way of putting a trade-mark on the boxes in which they ship and on the wrappers, and even on the skins of such things as oranges? Well, it seems there's a beetle that has been trade-marking the fruit it handles, for goodness knows how long. It's a little rough, brownish beetle with a long nose and little bumps that look like brown sealing wax, on each wing cover. It is a snout beetle known as the curculio. She

LEFT
Larvæ of round-headed apple tree borer in chamber in an apple tree.

RIGHT
Round-headed apple tree borer at work, male and female.

deals in plums, peaches, apricots, and cherries. When peaches, say, are about the size of a hazelnut she takes that long, sharp nose of hers, digs a slanting hole into the fruit, enlarges it at the bottom and lays an egg in the mouth of the hole. Then with her nose she rams the egg down. Finally, with this same remarkable nose-of-all-work, she cuts a crescent-shaped flap in the fruit, right under the hole into which she has rammed the egg, and that's why she has the nickname of "the little Turk."

But what is she up to? Why does she do this? Her idea seems to be to make a scar so that the fruit can't grow at this point and so crush the egg.

Now before going back to the house, after our stroll in the orchard on a beautiful October day, let's see what we can find inside of this windfall, a nice big pippin. Cut it open. A perfect maze of little tunnels all through it. That's the work of the railroad worm! You remember how Chicago and other great railroad centers look on the map, don't you?

This railroad worm, I want to say, is one of the worst customers you'll have to deal with. You'll see the fly that lays the egg buzzing about in June and July. She's called the "apple fly." She's a trifle smaller than the house fly but has a larger head for her size and a queer body. This body of hers is shaped like a top, pin and all. With this pin she punctures the growing apple and lays in it just one egg. The result is that one of these flies, single-handed, can ruin from one to two bushels of nice apples.

It's against all this class of people that constant warfare must be waged. I've got nothing against them *personally*. They have their living to earn, but so have *we;* and they would be just as well off if there were fewer of them, and we had more and better apples.

COURTESY U. S. DEPT. OF AGRICULTURE

Larva of flat-headed apple tree borer in burrow.
Insert, Flat-head apple tree borer.

COURTESY U. S. DEPT. OF AGRICULTURE

THE LITTLE TURK

The harmful curculio with the pointed beak which bores a hole in the fruit.

The Lightest Wood in the World

By R. N. DAVIS
Curator of Everhart Museum

ONE of the famous questions propounded by Edison was the name of the lightest wood. This honor goes to the tropical American tree known as the balsa. The name is the Spanish for "raft," and was applied to the tree and its wood because the early Spanish explorers found the natives using the tree trunks as rafts. They still function for that purpose, but civilized man has found many other uses for this remarkably light wood.

During the World War thousands of mines in the North Sea were attached to floats of balsa wood. On account of its porous quality it has been found the most efficient non-conductor of heat and so is coming into great use in refrigerator plants. Being lighter than cork, it is coming into use for many of the purposes for which that bark is generally used.

The balsa is known to botanists under the generic name of Ochroma, of which there are several species. It is ranked in the order Malvales—the order which includes the mallows, hollyhocks and cotton. Like the cotton this tree produces a fibrous material in the fruit, which is highly valued for pillows, cushions and mattresses. The tree grows rapidly and the wood decays in the forest very quickly. When it is used for the purposes mentioned above it is necessary to give it a chemical treatment to preserve it.

The Colonel L. A. Watres Expedition to Panama from the Everhart Museum made Gamboa the chief headquarters. This place is very near the middle of the Isthmus and at the Atlantic end of the Culebra Cut. The "spoil" from the cut was used to fill in the low ground on which the present settlement stands. About the houses there were numerous balsa trees, some of them more than a foot in diameter. Just how old they were could not be learned, but they must have grown up since the digging of the canal. As trees can grow there during the entire year, it is to be expected that the

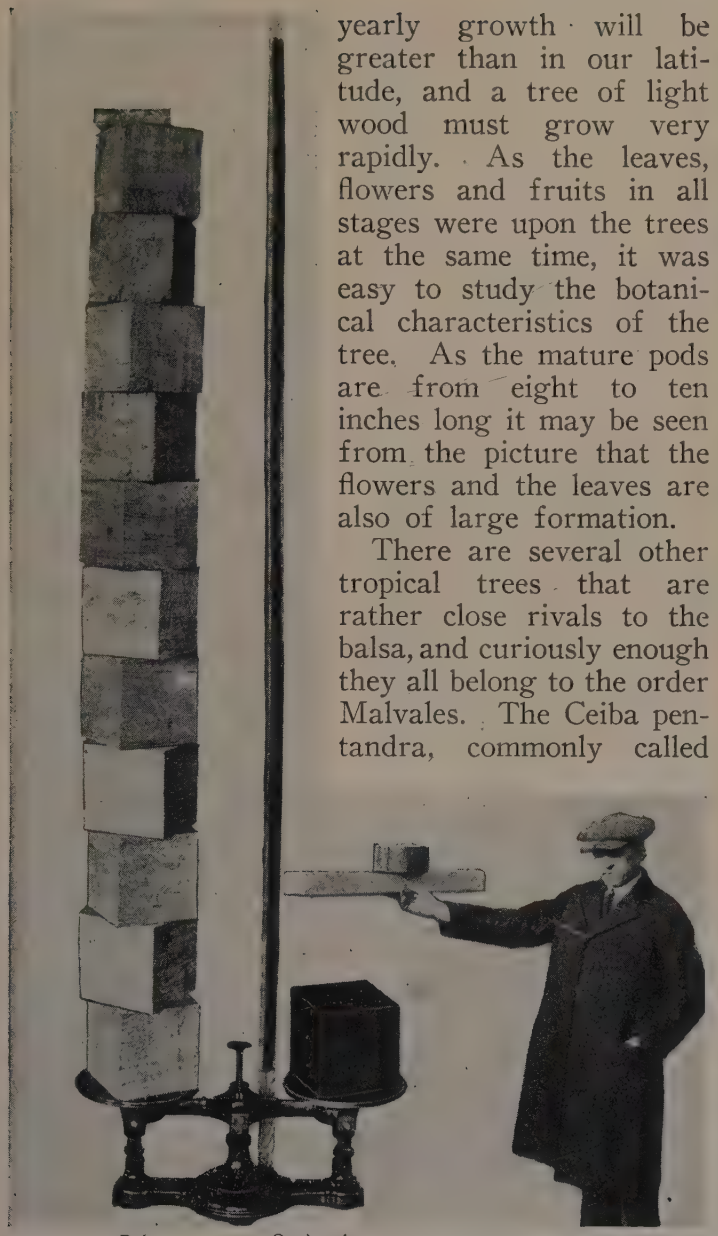
PHOTOGRAPH BY AMERICAN BALSA COMPANY

TWELVE-FOOT LOGS OF BALSA WOOD ARE EASILY CARRIED

This peculiar and rapidly growing tree of the tropics is closely related to the mallows, hollyhocks and cotton. It weighs only seven pounds to the cubic foot while some of the heavy woods weigh as much as eighty.

yearly growth will be greater than in our latitude, and a tree of light wood must grow very rapidly. As the leaves, flowers and fruits in all stages were upon the trees at the same time, it was easy to study the botanical characteristics of the tree. As the mature pods are from eight to ten inches long it may be seen from the picture that the flowers and the leaves are also of large formation.

There are several other tropical trees that are rather close rivals to the balsa, and curiously enough they all belong to the order Malvales. The Ceiba pentandra, commonly called



PHOTOGRAPH BY AMERICAN BALSA CO.

THE SCALES SHOW A BALANCE BETWEEN THE WORLD'S LIGHTEST AND HEAVIEST WOODS

RIGHT

This is not a "strong-man act." The beam weighs but one and three-fourths pounds although the volume is one-fourth of a cubic foot. Resting on the beam is a cross-section of a trunk of a balsa tree eight inches in diameter.

the silk-cotton or cotton-wool tree, is one of these. The cotton-wool from this tree is known as "kapok," and this term is also applied to the cottony growth in the pods of the balsa. While the ceiba is not so light as the balsa, it grows to a larger size and the wood will no doubt come into use for certain purposes where the extreme lightness of the balsa is not essential. The ceiba grows in Panama to a considerable extent, as well as in other tropical countries.

A very light wood of tropical Africa is the baobab, the Adansonia digitata of the botanists. From pictures of this tree one would judge that the trunk is very short in comparison with the diameter

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BALSA TREE TWO YEARS OLD

The leaves, flowers and fruit in all stages of development are to be seen at one time on balsa trees.

BALSA TREE TWO MONTHS OLD

This indicates how rapidly the tree grows in the warm and abundantly watered soil of the tropics.

The Lady's-Slipper—or Moccasin-Flower

By DR. ALBERT A. HANSEN

THERE are some flowers so wonderfully gifted by nature that their beauty is a great handicap. In this class belong the lady's-slippers, among the most gorgeous of our wild flowers and for that reason among the most eagerly sought. There are few people who can resist the temptation to pluck this lovely blossom, to be carried home in triumph and exhibited with pride. In regions where they still grow freely the lady's-slipper is being rapidly exterminated by flower venders and wanton collectors, until it is now among the rarest of our wild flowers.

In the writings of Peter Kalm, one of the early botanical explorers of the New World flora, frequent allusion is made to the wonderful display of the pink lady's-slipper in the region that is now the eastern part of the United States. The exquisite beauty of the plant made so strong an appeal to the aboriginal Indians that the flowers were used as hair ornaments by the Indian maidens and they played an important part in certain ceremonial dances. Throughout the vast territory in which the lady's-slipper so long held sway as the queen of beauty among flowers, but a comparatively few patches have survived, mere relics of former abundance.

THE SHOWY LADY'S-SLIPPER

(*Cypripedium spectabile*)

There are few people who can resist the temptation to pluck this lovely blossom.

In addition to lady's-slipper, the common name moccasin-flower is also frequently used. The name alludes to the shape of the flower, which bears a fanciful resemblance to the Indian slipper or moccasin. The technical name, *Cypripedium*, is derived from two Greek words and means "slipper of Venus."

There are a number of species of lady's-slippers, among the commonest of which are the pink lady's-slipper, the yellow lady's-slipper or whippoorwill's shoe (of which two varieties may be found, the small and the large), and finally the showy moccasin-flower. The pink species is perhaps the most familiar of all. There is one section of New England in which it may still be found in sufficient abundance to be offered for sale in the catalog of at least one commercial exploiter of our wild flora. In addition to its rare beauty, the blossom is gifted with a delightful faint fragrance. The species grows best in deep dry woods from Georgia and Oregon northward. The finest display I have ever seen of the pink lady's-slipper was in the lovely sand dune region in northwestern Indiana. It was from this source that a vandal school teacher, according to her open boast, collected over four hundred specimens in a single afternoon! Fortunately, the state of Indiana has recently passed a law whereby an area comprising two thousand acres of the finest dune land in America will be purchased and used for the establishment of a state park in which depredations of this character will be forbidden.

The showiest species is the yellow lady's-slipper, a magnificent plant that may be found on moist land, particularly in bogs and shady wet places, from Nova Scotia across the continent to Washington and Oregon, and southward in the Allegheny highlands to Alabama. The flowers of both the large and the small variety are bright yellow

in color, but the former has little or no fragrance, while the flowers of the latter, though but half the size of its larger relative, are blessed with a fragrance that is very sweet though faint. Large colonies of yellow lady's-slippers may still be found in out-of-the-way northern bogs.

The showy moccasin-flower is considered by many to be not only the handsomest of the *Cypripediums,* but the most beautiful of all our native wild flowers. This exquisite blossom is of the purest white with the exception of a globular lip that is stained with brilliant pink-purple. Occasionally absolutely pure white forms may be found, their rich, chaste beauty an almost irresistible temptation to the lucky discoverer. The showy moccasin-flower delights in bogs and rich, cool woods. It is found most frequently in northern woods and extends southward only in the Allegheny Mountains. The gaudy flowers appear during midsummer.

PINK LADY'S-SLIPPER
(*Cypripedium acaule*)

The pink lady's-slipper has been exterminated in many localities by promiscuous gathering. The plant is becoming increasingly scarcer throughout its range.

The lady's-slippers are really wild orchids, a class of plants so highly specialized to secure cross-fertilization that overspecialization has almost been their undoing. The mechanism to secure cross-pollination is so complicated and elaborate that self-pollination is almost an impossibility. Pollination is usually done by hungry bees that gain entrance in their quest for food through the gateway afforded by an opening in the upper part of the large inflated lip. In the pink species the gateway closes behind the guest who eats his fill from glands found inside. After the feast, exit is secured only through a narrow passage in which pollen that may have been deposited on his back by another flower is combed off by a sticky, brush-like stigma. On the way out a new mass of pollen is dusted on the bee's back, to be carried to another blossom and thus is cross-pollination secured. The common bumblebee is a frequent visitor to the pink lady's-slipper.

A feature that makes it difficult for these wild orchids to hold their own in competition with other plants is the fact that few of the seeds are capable of germinating, since a certain fungal relationship seems to be necessary before the seeds can form new plants. Furthermore, the seeds are not only among the most rudimentary in structure, but they are also exceedingly tiny. When released from the pod they float in the air like a cloud of dust. So small are these seeds that several hundred thousand are required to weigh a single grain.

The lady's-slipper is one of our leading candidates for honors as a national floral emblem. No other plant can surpass it for sheer beauty, not only of flower but of foliage, since the broad, bright green leaves are exceedingly handsome. In addition to its many other attributes, the lady's-slipper is native to America. Certain it is that no one can accuse this exquisite plant of ever becoming a weed, an accusation that the proponents of the goldenrod, daisy and other candidates for national floral honors cannot refute. The only valid objection to the lady's-slipper is the increasing rarity of the plant and the difficulty of growing the species under cultivation.

That the various species of the lady's-slipper are disappearing over large areas cannot be denied. This fact was brought to my attention in a striking manner a few years ago. While examining the herbarium of the Pennsylvania State College, I discovered a number of specimens of the yellow lady's-slipper that had been collected in the college woods about forty years previously. Never having seen the species growing wild in Center County (the county in which the college is located), I requested the ten members of the botanical faculty to keep on the lookout for the plant. The request was communicated to several hundred students enrolled in the botany classes. After a year's search, a

single plant was finally located and the location carefully marked. It was probably the sole survivor of the species in the entire county. On returning

SMALLER YELLOW LADY'S-SLIPPER
(*Cypripedium parviflorum*)
A common name for this flower is the whippoorwill's shoe.

YELLOW LADY'S-SLIPPER
(*Cypripedium pubescens*)
This species is one of the handsomest of our native orchids.

to the spot the following year, the plant had disappeared, probably torn out and ruthlessly destroyed by a thoughtless collector. I cite this as an example of a species that was probably exterminated throughout an entire county (no other specimens have since been found), in the short space of twoscore years. How much better would it have been to have allowed that lone survivor to bloom and reproduce its kind for the enjoyment of future generations!

The Lightest Wood in the World

(CONTINUED FROM PAGE 167)

of the tree and it would seem to be difficult to utilize the wood. The Hibiscus tiliaceus is also famous.

It is interesting to note that in the tropics there are great extremes in the density of the woods. While we have no wood that will sink in water when seasoned, many of the woods of the tropics have a specific gravity greater than unity. Among them are the quebracho, ebony and lignum vitae. In our temperate latitudes the trees do not go to such extremes. Our lightest wood is considered the arbor vitae, with a weight of twenty pounds to the cubic foot, while our heaviest is hickory, which weighs fifty-two. Some specimens of the balsa weigh only seven pounds to the cubic foot, while some of the heavy woods run into the eighties. While there are extensive forests yet in the tropics, the trees are extremely light and soft or else are very heavy and hard to handle. The tropical forests are made up of numerous species mixed together and few of the trees are adapted to general purposes like our conifers and hardwoods.

LEAVES, FLOWERS AND FRUITING PODS OF THE BALSA

Giant Garypus of the Gulf of California

By JOSEPH CONRAD CHAMBERLIN

BUT few observers, I venture to state, are acquainted with the peculiar group of animals to which the giant garypus belongs.

Popularly—if we may be permitted the use of the term in dealing with as little known creatures as these—they are the false scorpions. Scientifically and perhaps just as popularly they are Pseudoscorpions. Two factors have chiefly served to keep them from being very generally known, these being

With seemingly awkward claws opened wide, garypus grotesquely, and with relentless fixity of purpose, hunts for his prey.

first, their minute size, and secondly, their obscure habitats. They are far from uncommon and may be found almost anywhere under the bark of trees, under stones, in leaf mould and various other obscure places. Some of them have been taken in very peculiar situations. One species, for example, has been collected most abundantly in human graves, where it undoubtedly feeds upon some of the minute and pallid organisms that thrive even in the sepulcher. Others occur at times very abundantly in beehives, and still others have adapted themselves to at least a partial existence under the wing covers of certain large beetles.

The large Prionus, a beetle of the eastern states, has several times been found with as many as a dozen or more of these creatures living in this situation. Whether they are truly parasitic is a matter yet to be worked out. More probably they feed upon certain mites which are true parasites of the beetle, and thus may be classed as welcome guests. Or perhaps they are just taking a ride. This latter theory has been advanced several times in the past to account for these and similar instances. Another situation in which they are not unusually found is clinging to the legs of flies, and this has more than almost anything else served to bring them to the notice of the general public. My own observations, as well as those of others, have convinced me that they prey upon the flies so infested. For hours, perhaps, they will cling to their unwilling prey, eventually tiring it out and then feeding to satiation upon its juices. Ordinarily they feed upon smaller insects and animals and perhaps it is only accidental that they sometimes grasp prey normally too large and hence are dragged hither and thither by their frantically protesting victim. They are incapable of feeding upon solid food, and simply suck the juices of their prey. When the comparatively large size of some of their victims is considered, it seems rather odd to find that they are without poison glands of any sort.

A view from the rear. It is hard to catch garypus unawares. The great palpi guard the front and sides while two pearly white, backward-directed eyes, guard him from behind.

Garypus sini, the giant garypus of the Gulf of California, is one of the largest of his kind—attaining the extraordinary length of a quarter of an inch exclusive of the powerful claws.

The garypus belongs to that great group of animals known as the Arachnida, which includes the spiders, scorpions, mites and ticks, as well as certain other groups, which are almost or quite as obscure as they are themselves. While resembling the true scorpions in a way, they are in reality only moderately closely related to these creatures.

Garypus sini (pronounced with the accent on the first syllable) is one of the largest of the Pseudoscorpions and reaches the astonishing length of almost a quarter of an inch, exclusive of the formidable claws. Thus their awkwardly ferocious appearance, as seen in the accompanying photographs, is actually more apparent than real. We

may well imagine, however, that they are frightful specters for the minute creatures upon which they ordinarily feed.

Commonly this species is found upon the beaches of the entire Gulf of California coast, while closely related forms inhabit the coasts of practically every maritime country on earth. They never occur more than a few feet above the high tide level and are very often found below it. They can endure hours of submergence without the slightest external protection and apparently emerge from their bath none the worse for the wetting. When thus immersed they hunch themselves together as compactly as possible, their enormous claws are folded close in upon their bodies, and they remain thus, scarcely moving until the waters again recede and release them to an active existence. Usually the beaches

The little sand "house" of garypus is hung dome downwards from the under surface of a stone, piece of driftwood or some other convenient object. It serves as a place of refuge during both moulting and nesting periods.

where they are most common consist of a strip of sand plentifully besprinkled with rocks, pieces of driftwood, and so forth, under which they and their curious dome-shaped little sand "houses" are found.

Like all other Arthropods, as the great group of animals to which they belong, together with the insects and crustaceae, is known, they shed their skins at more or less regular intervals to permit growth. They have developed a very interesting habit in this connection. About themselves they spin a little dome-shaped nest about the size of a raspberry, which is attached to the under surface of a rock or piece of driftwood. Entirely covering this silken envelope are sand grains, tiny bits of wood and even some larger particles. This external coating serves as a hard protective armor and affords a considerable degree of rigidity to the silk which supports it. The bits of sand or gravel are placed in position by the large claws which reach outside the rapidly shaping nest to obtain the material. Finally the last "stone" is in place and the nest is completed by finishing the internal lining which not only serves as a protection to the soft body of the

In advancing the great claws, or more properly chelate palpi, are outstretched and continually in motion, ready either for instant attack or defense, as the case may be.

moulting animal but also serves as an entirely waterproof covering which will keep it completely dry in spite of numerous immersions in the regularly rising tides of the sea.

Then garypus enters a resting stage where but little movement takes place—for an unknown length of time. Finally a fissure occurs around the front and sides of the great dorsal shield, which folds back upon the abdomen, and the creature gradually works its way out of the old skin, which shriveled and dry remains in one corner of the nest. At this

At the time garypus completes the moulting of his old skin, he is but a flabby, pallid shadow of his former powerful self.

stage, garypus, ordinarily dark and heavily armored by its thick horny integument, is now but a flabby and pallid shadow of its former self. Almost white and translucent, the great palpi lie helplessly along its sides and we can now easily understand

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WINTER ATTIRE SUMMER DRESS

The Red Maple, a Popular Tree

(*Acer rubrum*)

By L. W. BROWNELL

THE RED MAPLE, scarlet maple or swamp maple, as it is variously called, is one of the most common and generally distributed trees of North America. Its range extends from New Brunswick and Ontario south to southern Florida and west to Dakota, Nebraska and Texas. It occurs in greatest abundance along the borders of streams or in low swamps where it often forms extensive groves to the almost entire exclusion of any other species. It often, however, frequents higher ground, forming, in company with other species, an important part of the forests in upland regions. It is, perhaps, commonest in the south, especially along the Mississippi River. It attains its largest size in the swamps along the lower Ohio River.

In general it is a medium sized tree averaging about forty or fifty feet in height with a trunk diameter of from one to two feet. Under favorable conditions, however, it will reach a height of one hundred feet with a trunk four feet in diameter, and trees as high as one hundred and twenty feet have been known. In the open the trunk divides at from eight to ten feet from the ground into several ascending limbs, from which stout branches extend almost horizontally to form a compact, egg-shaped head. Under forest condition the tree grows taller and slimmer with a very much restricted head and fewer branches.

No other of our maples has such a tendency to vary with respect to the size and shape of its leaves. As many as eight or nine varieties of this tree have been described at different times principally from this variation in the leaves. This, however, is not a consistent characteristic and cannot be depended upon for the determination of even a variety. The leaves of two specimens standing side by side may show the extremes of variation, and even those on one tree may differ, occasionally going so far as to show decided variety on the same branch. The typical leaf is the one shown in the accompanying illustration. In general outline it is nearly round with three deep, irregularly serrated lobes and another much smaller pair at the base. Frequently the lower, smaller pair are entirely missing, leaving

only the three large lobes. Another common type of leaf is longer and narrower, with greatly reduced side lobes and the main one much lengthened.

The flowers of the red maple have been described as polygamous, that is, perfect and unisexual flowers appear upon the same tree. It is possible that perfect flowers do sometimes occur but, if so,

FRUIT OF THE RED MAPLE

they are very rare. I have never seen them. The flowers appear in late March some time in advance of the leaves and, at this time of the year one need never mistake a red maple, for the flowers, either bright scarlet or yellowish-red, which cover the twigs and smaller branches in dense clusters, make these trees stand out conspicuously against the otherwise somber browns and greys of our hillsides and wooded lowlands. Occasionally the staminate and pistillate flowers are borne on the same tree but more frequently upon separate ones. The staminate form is more frequently yellowish-red, the pistillate almost always bright scarlet and greatly resembling the seeds in miniature.

The fruit, which matures in May or early June, is the typical maple-winged double seed. These are about an inch, or sometimes even less, in length and are scarlet or reddish-brown in color. The wings are less divergent than are those upon the seeds of any other of our maples, sometimes hardly separating at all. They are borne in clusters of half a dozen or more on long, drooping stalks three or four inches in length.

The bark on the trunks of the mature trees is thin, not more than half an inch thick, and dark grey in color. It is divided by longitudinal ridges, the surfaces being broken up into large, flat scales which frequently give a decidedly shaggy appearance to the tree. The bark of the limbs and branches and that of young trees is smooth and light grey, somewhat resembling that of the beech. The bark of the twigs is dark red at first, finally turning

BLOSSOMS OF THE RED MAPLE

to grey. A home-made ink was, in earlier days, sometimes made from the bark of the red maple by boiling it and adding sulphite of iron. It contains considerable tannin and, at one time, was occasionally employed in dyeing.

In the north, particularly, the red maple is one if not the first, of all our trees to change the color

of its foilage. It is far from being an unusual sight to see an individual specimen beginning to assume the autumnal tints by the end of August, and a single flaming branch in an otherwise entirely green tree is quite a common sight at this time of the year. The latter part of September, or early October, will generally see the red maples completely clothed in their scarlet covering.

LEAVES OF THE RED MAPLE

The wood of the red maple is very heavy, close-grained, easily worked and not very strong. In color it is light brown and often has a reddish tinge. It is used in considerable quantities in the manufacture of furniture, wooden ware, flooring and gun-stocks. Occasionally the wood of a tree will display the variations from the straight grain that earns for it the names of "curly" and "bird's-eye" maple. The lumberman carefully separates such logs from the others as they are much more sought after by the furniture manufacturers and are, therefore, much more valuable than the straight-grained variety.

The red maple, by its beauty in the early spring, attracted the attention of the early travelers to these shores. It was carried to England as early as the middle of the seventeenth century, where it has been grown quite extensively ever since. There is hardly a more desirable tree for planting in private grounds, parks or along roadsides. While it is a native of low ground, frequently actually growing in deep water, it flourishes just as well and attains as great size when planted in rich upland soil. Its symmetry of form, the beauty of its leaves both in summer and fall, the vivid coloring of its blossoms and fruit in the spring, its freedom from disease and dirt, all join to make it one of the best of all our trees for ornamental use. It should, however, always be planted where there is sufficient space to allow for its full development.

Giant Garypus of the Gulf of California

(CONTINUED FROM PAGE 172)

why the protective nest is necessary during this dangerous and critical period of its life. After several days the new skin hardens and before long the erstwhile bound and helpless monster cuts its way through the base of the prison-like nest and emerges into the open air, again to be a terror to the creatures upon which it preys. The female, at the time she has young, spins a very similar nest and remains therein from the time the eggs are laid until the young are fully developed and capable of taking care of themselves. Now, as for ages past, the lonely waters of the sea beat ceaselessly upon the shores where lives, thrives, and grotesquely hunts, our friend, the giant garypus of the Gulf.

The Australian Koala

By KILROY HARRIS

THE KOALA of Australia is a tree-climbing marsupial, like a small bear in its heavy build. It stands about eighteen inches in height, and is about two feet long; the fur is short and woolly, and of an ashen-gray color, with white spots near the haunches. The tail is so short that the layman thinks the animal does not possess one; a slight examination of the vertebrae, however, places this beyond doubt. Except for the slight resemblance, there is no affinity between the Koala and the ordinary bear.

The Koala, which, by the way, is the original of the "Teddy Bears" sold in American toy shops, has a peculiar cry, which very much resembles that of a child in distress. Hearing its plaintive wail for the first time, the "new-chum" (stranger in Australia) could easily mistake it for that of a little boy or girl actually lost in "The Bush."

The native bear's food consists chiefly of young leaves of the Eucalyptus tree. The baby Koala is carried on the mother's back as the latter climbs the tree in search of food.

The Koala's eye is small, but as in the case of the cat, the pupil expands in the darkness. This quaint little denizen of the Autralian bush is nocturnal in habits, and during the day is nearly always perched upon the limb of some high tree, asleep. It is a thick-limbed animal, not much addicted to locomotion; it is easily caught, and is easily tamed. The young Koala is always called "Joey."

AN AUSTRALIAN BEAR

This animal is said to be the original of the famous "Teddy Bear," sold in toy shops.

How Trees Make Sounds

By HOWARD H. CLEAVES

THE NIGHT holds many mystifying sounds. How often in passing through the dark woods, one stops short and asks himself, or whispers to his companion, "What's that?" It may seem like distant groaning or near chattering. Again one would suppose a rodent to be squeaking his last in the death grip of a weasel, so high pitched and penetrating is the sound.

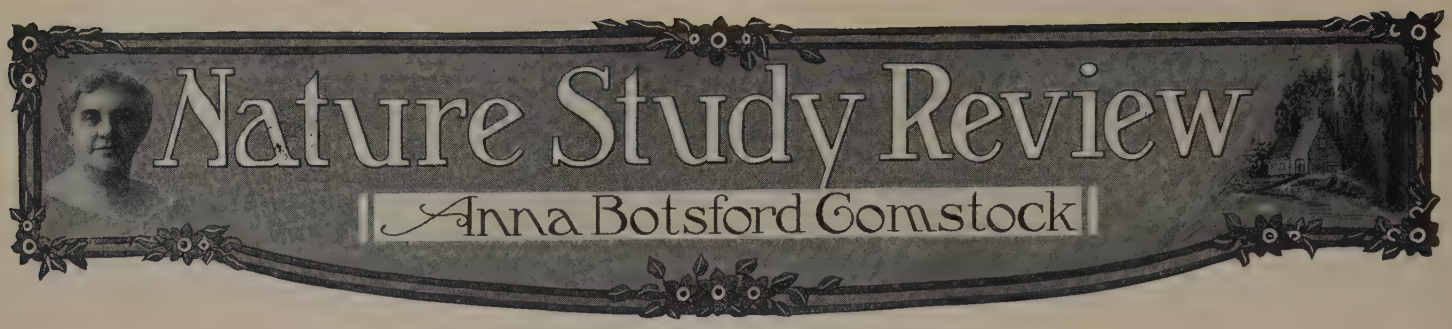
One bright day I was following a woodland path along which I had passed a few nights previous. A light wind was fanning the tree tops. Suddenly I heard a noise overhead which I recognized as the same which had puzzled me on a previous evening as I had passed that way, although the same sound frequently seems different, depending upon whether it is heard in the day or at night. I now suspected what presently proved to be the truth. It was noticeable that the chattering to which I was listening coincided with the heavier wind thrusts that swayed the tree trunks. I walked slowly in a circle, looking upward. At first I saw nothing, but at length I detected the edge of a yellow-white chafe mark where the horizontal limb of one tree was rubbing against the trunk of another.

FRICTION BETWEEN FOREST NEIGHBORS

The white oak on the right having been chafed beyond endurance by its neighbor the beech has taken a death hold on the offender.

This friction among the limbs and trunks of trees is a commonplace in the forest, but one does not meet daily with so advanced an example as that of the beech and the white oak shown in the accompanying illustration. I took the photograph at Huguenot Park, Staten Island, New York. How many years the sturdy young oak had "tolerated" the irritation from the limb of the beech I do not know, but the oak had finally retaliated by closing tightly upon the member of its neighbor with a grasp which was never to be loosened. The oak suggested to me a bulldog holding a bone cross-wise in the rear of his jaws, with mouth distended at the corners. The beech limb had thus been strangled to death, though not before the boll of the oak was horribly disfigured. The proboscis-like extension from the trunk of the beech is noticeable, this development having occurred at the base of the afflicted limb only.

A popular belief seems to be that a scar on a tree trunk "grows upward with the tree"—that the scar increases its distance from the ground as the tree grows. Such, of course, is not the case. A scar caused by barbed wire on a tree trunk three feet from the ground when the tree is ten years old will still be three feet from the ground when that tree is thirty years of age or older; and a blaze mark struck shoulder high by a surveyor or a trapper on a forest tree a hundred years ago will still be shoulder high today if the tree yet stands. A tree expands in girth with the seasons, but greater height is attained only by new growth at the top.



Parent-Teacher Associations and Nature Study

The growth of parent-teacher associations has been most encouraging during recent years. However, as yet these organizations have gone but a few steps in the paths of helpfulness that lie before them, if they develop along the lines of cooperation and reciprocal helpfulness. It does not take prophetic vision to foresee that both home and school will ultimately be modified and improved if the teachers and the parents work happily together.

Many mothers have come to us for help and advice in their attempt to create some real interest in out-of-door life on the part of their children. Such mothers stand ready to help the teachers in their efforts to carry on successful nature study. Mothers with such ideals are now using the parent-teacher associations to help accomplish this desired end, and we have had the pleasure recently of taking part in a program of the New Jersey State Parent-Teachers Association and Mothers' Congress held at Ocean City in July. A summer school for teachers was in progress at this popular seaside resort, so in the audience there were combined about four hundred teachers and more than a hundred mothers; both teachers and mothers seemed interested in a practical nature study program.

The officials of the New Jersey organization are women keenly alive to all of the possibilities of their undertaking. The chairman of the committee on out-of-door life has been a teacher herself, and now lives very close to nature on a farm that gives her and her children ample opportunity for continuous and interesting observation. She is able, wise and far-seeing as to the benefits and possibilities of closer touch with nature for the children of her state, and she is carrying out a program that will help the teachers of New Jersey in the right kind of nature study and in the right way; she as well as her colleagues feel deeply that the work of the parent-teachers association must be thoroughly sympathetic in order to assure good team work in the nature study field as well as in other phases of education. It is to be hoped that other parent-teacher associations will take up this work.

An Indictment of the Screech Owl

To bird lovers there is something very fascinating about the wise-looking little screech owl that hides itself so securely by resembling a knot on a branch in the daytime, and which sends chills down our spines at night by its terrifying wail. The general feeling has been that while the screech owl takes birds occasionally, it is likely to restrict its diet to English sparrows and field mice. Dr. Arthur A. Allen has been watching carefully a pair of screech owls in his bird sanctuary at Ithaca, N. Y., and in *The Auk* gives us the result of his investigations. The following is an account of the feeding of three young owls for one night:

"The night of July 3, the young owls were first fed at 8:44 and last at 4:15. They were fed but 14 times, eight birds and six insects. The birds were brought at fairly regular intervals during the night, as follows:

"9:35 Female Redstart.
11:00 Goldfinch.
1:45 Female Tanager.
2:30 Phoebe.
3:15 Cedar Waxwing.
3:39 Goldfinch.
4:00 Cedar Waxwing.
4:15 Phoebe."

This is a pretty bad record for the screech owl. During the time that the nest was watched 98 birds of 24 different species were killed by this pair of owl parents, and as Dr. Allen so well states:

"From the data here presented it seems evident that the screech owl is a powerful factor in maintaining the balance of nature but, from the standpoint of increasing insectivorous birds, he is an equally powerful menace."

It would seem from Dr. Allen's observations that teachers should make plain to their pupils the fact that if they wish to preserve the birds about their homes or in bird sanctuaries, the screech owl should be eliminated.

Bird Study in the Kindergarten

In one of the public schools of a manufacturing town in Illinois there is a kindergarten teacher who is a true nature lover and who has the personality that appeals to children, which should be a prime requirement for a teacher of little ones. She has never had any time set aside for nature study because she has kept the children in the atmosphere of it continually. This teacher has had remarkable success teaching the children to identify birds. A feeding station outside the window brought the birds in rather meager numbers, for the school is in the middle of the city. However, the nut-hatches, downies and sparrows were there, and occasionally the chickadees came, to the children's unending delight. Colored pictures were used to familiarize the

little ones with the colors and appearance of the birds. The joyful day of the week was that on which field trips occurred; these sometimes lasted two hours, but usually about an hour and a half. Some definite thing to be looked for was talked over interestedly before starting, but as they walked all sorts of things were noted and enjoyed; probably they were enjoyed all the more because the chief object of the walk acted as a thread of interest on which to string observations on flowers, trees, squirrels, clouds, or whatever was in sight. Through the happy and unconscious training the children had received in studying and identifying the colored pictures they were very keen in identifying the birds in the woods, fields and parks. The truly remarkable accomplishment of the year was made manifest in the spring when the older ones, who were to enter the first grade in the fall, were able positively to identify thirty birds.

The teacher in the first grade of that school was not interested in nature study, but the teacher in the second grade was greatly interested and had cooperated with the kindergarten teacher, and she was naturally pleased to find that when these children reached the second grade they were still able to identify thirty birds.

An interesting experience with a subnormal child occurred in this kindergarten. The boy had very low mentality. When shown the picture of a bird he might call it a horse one day and a cow the next. However, during the field trips he became greatly interested in seeing the real live birds; and strange to relate, he could see birds at a greater distance than could any other child in the class, and seemed to experience great delight in looking for them. At the end of the year he knew nearly all of the thirty birds by sight and by name, although he did not seem to develop along other lines.

The Australian Laughing Jackass

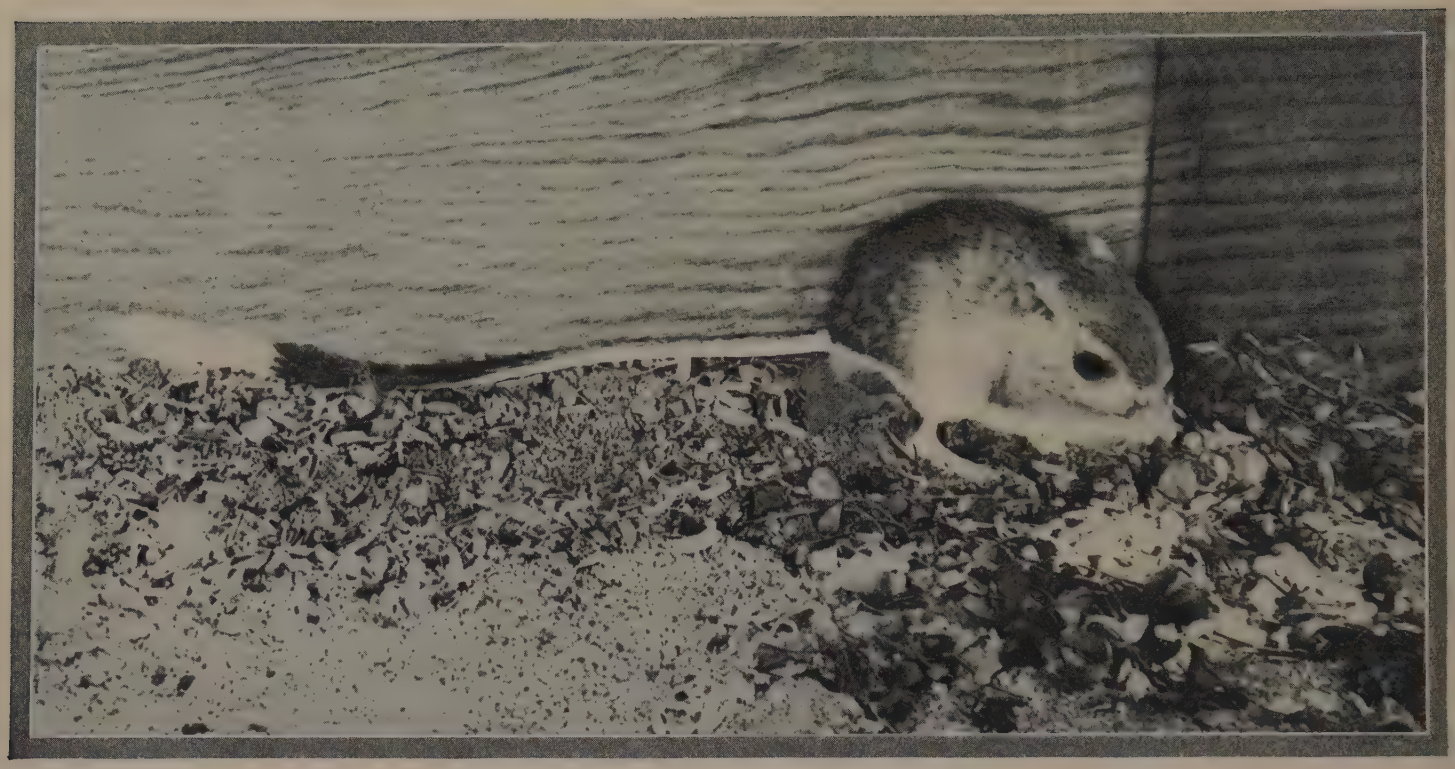
By KILROY HARRIS

THE Gigantic Kingfisher is perhaps the best known bird in Australia. At intervals during the day, its cry, which resembles prolonged laughing, may be heard in almost every direction in "The Bush." Not infrequently, two or three or even half a dozen birds assemble in one tree, when their combined efforts, representing sounds which differ considerably in pitch, produce an effect ludicrous in the extreme.

Originally called the "Gogo-bera" by the Aboriginals, the "Kookooburra" is a very friendly and wise old bird, found everywhere in the Australian Bush. He is the original "Laughing Jackass." In the early days of Australian settlement, he was known as "The Settlers' Clock," because he always called the Bush folk to another day's work at dawn, by his uproarious laughter, and said "good-night" to them in the same way, at dusk The Kookooburra's laugh is very infectious, and to hear half a dozen laughing together is as good as going to a minstrel show. "Jacko" is almost as good as "protected" by Act of Parliament, as no Australian would ever think of shooting one. He keeps a wary eye on snakes, and so long as "Jacko" is about, there is nothing to fear in that direction. As soon as the bird catches sight of a snake, he swoops down, grabs the snake at the back of the head, flies fifty or a hundred feet up in the air, and then drops the snake to earth. He will keep on doing this until the snake is hors de combat, after which "Jacko" will retire gracefully to the nearest tree, and survey the scene of battle, meanwhile laughing so heartily that he fully justifies the title of "The Laughing Jackass."

THE LAUGHING JACKASS

This was the name given the gigantic kingfisher in the early days of Australia.



BANNER-TAIL PHOTOGRAPHED FROM LIFE

Notice the hip stripe, the sharply contrasted tail markings with conspicuous white terminal banner, and the distribution of white about the nose, eyes and ears.

Banner-Tail of the Bajadas

By WALTER P. TAYLOR

(PHOTOGRAPHS BY CHARLES T. VORHIES)

FOR SOME time no sound had been heard from the box in which I had carefully placed my latest captive, and, becoming curious, I slipped the cover to one side, just a little, and peeked in. No, he had not escaped, but he did then! No Jack-in-the-box on a spring could have been quicker. I immediately started in pursuit, for I knew of several holes in and about the old tent house through which he might get out. I had anticipated that the chase would be principally a matter of following the animal around the floor boards of the tent, but when I made a dive for him I found he was not on the floor, but several feet up in the air. Every time he struck the floor he bounded like a ball of new rubber; so that instead of pawing the baseboards I found myself clawing the air in the vicinity of my hips and shoulders after the elusive little body. For, as a matter of fact, Banner-tail, the kangaroo rat, is champion high-jumper among all the rodents of the Range Reserve. A man, in order to equal his record, would have to clear the bar at seventy-two feet.

In addition to being champion high-jumper among all classes and kinds of rodents, Banner-tail has the added distinction of being one of the largest and handsomest of the kangaroo rats. He is at home on the long gently sloping plains—bajadas the Mexicans call them—of the Sonora desert country of the southwest, from Arizona, New Mexico, and Texas on the north to northern Mexico on the south. A true kangaroo rat, his hind feet are long and powerful and his front ones short and inconspicuous. His ears are moderate in size, his eyes bright. He possessess the same remarkable external cheek pouches which characterize his fellow members of the kangaroo rat tribe as well as their near relatives, the pocket-mice and their more distant allies, the pocket gophers. His color is grayish-buffy above, with white hip-stripes and underparts. The feature, however, which gives him his name is the long, handsome tail, with its conspicuously contrasted black and white striping and its prominent white terminal banner. The tail, in addition to its essential function as a balancer, serves also as a delicate organ of touch, especially in the darkness of the den.

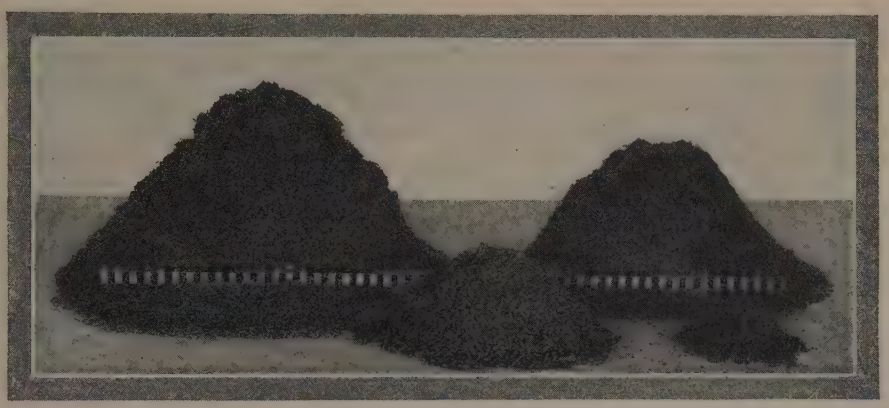
Banner-tail is not only one of the largest and handsomest of his family, but he also has an enviable record as an excavator and burrow architect,

and his den is of so complex and elaborate a character as to be notable not only among kangaroo rats but among all the rodents. No beaver lodge, or squirrel nest, or fox den, or mole hill, or bear cave is more characteristic of its owner than is the home mound of the kangaroo rat. He is born in a cosy nest some two feet or more beneath its surface, receives his earliest impressions within its maze of burrows, finds in it a safe shelter and secure resting place all his life long, stocks it with food against a time of shortage, enjoys a considerable freedom of movement in its roomy chambers and tunnels on stormy nights when it is not comfortable to go out, and sometimes even dies and is buried in it.

The height, extent, and bare appearance of the visible portion of the mound usually make it fairly conspicuous. Elevated from a few inches to a couple of feet above the surface of the ground, it occupies from four to twenty-five square yards of desert. Entrance is afforded by three or four, sometimes as many as a dozen, large, roundish holes, usually four or five inches in diameter. Since Banner-tail travels almost exclusively by hopping or jumping very much like a real kangaroo, and seldom or never uses all four feet in walking or crawling, the entrances of his house have been made ample enough to permit his hopping in and out at full speed. Radiating from the principal openings one may often see well-worn trails, sometimes leading to a subsidiary den at a distance of thirty feet or more, or occasionally to a den of equal size, but most often gradually fading out in the grass at some distance from the mound. On excavation, the mound is found to be honeycombed with a two- to four-storied labyrinth of passages, burrows, blind pockets, and chambers, some of which we will get back to in a moment.

I said the den serves as a shelter to Banner-tail. When alarmed the kangaroo rat seeks safety through flight to the home mound; not flight alone, notice, but always flight to the den. Once, when we had nearly completed the digging out of a large den, a big Banner-tail, no longer able to endure the strain, burst forth and ran rapidly along a well-marked trail to a smaller den about thirty-five feet away. Anticipating this, we had stuffed an old coat into the burrows of the smaller den so the rat could not enter it. On finding his way blocked, what did Banner-tail do? Instead of veering off to the right or left to safety, he faced about, and, in much less time than it takes to tell it, hustled back over his trail to the main den, into the company of the astonished excavators!

Such a commodious and roomy apartment as a kangaroo rat den could not fail to be attractive to many of the lesser beasts. These include various insects, small ground squirrels, rabbits, scorpions, lizards, and snakes. Once when we were excavating a den on the Range Reserve, it being my turn to dig, I threw off my gloves, which seemed to be in the way, and, despite warnings to the contrary, began exploring the nearest portions of the little animal's complicated subterranean system with my bare hands. As I was carefully feeling out the bottom and sides of the burrow in the search for possible blind pockets, stored food material, or a nest with young, a sudden, sharp, stinging sensation caused me to withdraw my hand with a good deal more speed than ceremony. Thoughts of scorpions, unknown poisonous insects and rattlesnakes came to my mind, and though there was no conspicuous outward sign of the wound, I feverishly plied the shovel in the attempt to catch up with the enemy and find out how badly I was hurt. The culprit proved to be nothing more than an innocent scorpion which had merely acted in self-defense. At that, he paid for it with his life, and I was much relieved, my feelings of uncertainty and alarm being now largely displaced by those of mild curiosity as to the effects of the sting of the scorpion, which, as a matter of fact, I found to be somewhat less severe than a bee-sting.



CONTENTS OF A KANGAROO RAT CUPBOARD

The Banner-tail does not imitate Old Mother Hubbard. Here we have the contents of a single den—a bushel or more of seeds of grasses, heads of plantain, and a little wild buckwheat.

In spite of popular and some scientific opinions to the contrary, conditions of life for the denizens of the desert are probably very little more severe than in many localities apparently more favorable. The desert environment necessitates different economic arrangements, that is all. Of course all the birds and mammals of the desert must have enough food and drink so that they can live, and grow, and

some day have families of their own. Mother Nature has brought up each different species to solve its problems for itself and in its own way. When the trying droughts come they find some animals asleep. Others are able to subsist on the scanty, dried-up vegetation which they can find from day to day, relying on succulent roots or stems for water. Still others, like Joseph of old, lay up stores against the lean days and have the remarkable power of supplying their need for moisture from their dry food, without ever in their lives, perhaps, enjoying a real drink.

CHEEK POCKETS FILLED AND EMPTY

The pockets are fur-lined and outside the mouth, and each will hold at least a teaspoonful of food materials; note the diminutive forelegs and feet.

A VERY CHARACTERISTIC LIFE POSE

The small front legs and feet are held so closely beneath the chin as to be almost invisible.

In the last-named group comes Banner-tail. In April and May, when the grasses and other plants have had an opportunity to grow and produce seeds following the rains of winter, and again in September and October, when the vegetation following the summer thunderstorms has had a chance to mature, the kangaroo rat becomes almost unbelievably industrious and makes countless trips from den to desert and back again, each time with cheek pouches crammed with grass seeds, grass crowns, tiny pods, fleshy stems, beans or edible fragments of certain ones of the most abundant plants growing within a radius of twenty-five to forty feet. He specializes, however, on the seeds and crowns of grama grass, that nutritious species which is of so much importance as a food for range cattle. His choice of the seeds and crowns is an extremely favorable one, for these portions of the plant carry a large quantity of nutriment in a small compass and with very little weight. When the harvest days are over the interior of the den has been transformed. Out-pocketings and underground cupboards, blind alleys and subterranean buffet closets, sometimes entire hallways and chambers of considerable size, all have consignments of foodstuffs. The material taken from a single mound more than filled a large burlap sack; from another den more than two bushels of grass crowns and seeds, with miscellaneous other plant parts, were recovered; in a third were twenty-seven thousand crowns of grama grass; and a fourth contained six hundred and eighty thousand cut sections of drop-seed grass. Talk of industry and efficiency! In the southwest the sluggard might better be encouraged to go to the Banner-tailed kangaroo rat than to the ant. As a result of all this activity the kangaroo rat generally succeeds in accumulating sufficient stores to tide him over the severest droughts that may develop—and drought periods in this country are serious enough, enduring for weeks and for months and sometimes, with scarcely an interruption, for years.

When thus serving as a warehouse the den must be unusually attractive to rodent robbers of various kinds, especially in time of food shortage. It is

(CONTINUED ON PAGE 188)

Boys and Trees

The Federation of Boys' Clubs maintains two training camps—one for the Midwestern Division at Winona Lake, Indiana, and one for the Atlantic Division at Ocean City, New Jersey. The teaching of natural history plays an important part at both camps, and a definite place is made in the camp programs for a study of trees by class work or observation hikes. Last year, the boys of the Midwestern Division thus found over thirty different species of trees, while the boys of the Atlantic Division found and identified eighteen. Both divisions are going to try to break the 1923 record in 1924. In the middle west, the boys come from Chicago, Milwaukee, Toledo, Indianapolis and Terre Haute. At Ocean City, the boys come from New York, Brooklyn, Washington, D. C., Philadelphia, Newark and Passaic. The American Nature Association will be glad to hear of other camps which are following up a similar line of constructive work.

Parks for Every State

Testimony of the great growth in the public interest in the out-of-doors was amply furnished at the three-day conference of the National Conference on State Parks, held at Gettysburg, Pennsylvania, May 26 to 28. More than one-half of the states now have at least one park, reports showed. Many questions bearing upon the administration and development of these areas were discussed by the conference, which went on record at its conclusion in favor of definite state park policies in the states. The conference urged regulation of billboards, opposed grazing in the national parks and endorsed the extension of nature study and creation of nature museums in the public parks. The meeting closed with a visit to the Mount Alto State Park of Pennsylvania. Judge John Barton Payne was reelected chairman of the conference for 1924-25.

Reports to Associations

In the interests of forestry investigation, tree planting, nature study and other activities within the scope of the American Nature Association and the American Tree Association, Mr. Richard W. Westwood has just completed an extended trip through the Northwest, British Columbia, the Pacific Coast and the Southwest. As a result of this trip the members of both associations will be given from time to time up-to-date reports on problems and conditions in these varied but related fields throughout the United States, with a view to keeping those interested in conservation closely in touch with the efforts being made throughout the nation.

The Spruce Budworm

The Northeastern Forest Experiment Station of the U. S. Department of Agriculture finds that in a number of places as high as 75 per cent of the trees in certain spruce regions of Maine have been killed by the budworm, and where the trees are not actually killed their growth is reduced to about 75 or 80 per cent of normal. White spruce, formerly supposed to be almost immune to the budworm attack, has been found a sufferer with the balsam and red spruce. In the light of our rapidly diminishing forests, this is a most serious blow. The studies of the Department of Agriculture are being directed towards finding some practical remedy.

School Museums

"A museum in every high school" is a new slogan in Kansas. Local history and the botany and geology of the respective localities are the subjects to be emphasized. The collections are to be made by the pupils to stimulate interest in their studies. Many high schools have found museums so conducted to be of great value.

Minnesota Going Forward

Despite a lack of funds necessitating the reduction of the field force of the Minnesota State Forest Service by about two-thirds, timberland owners of the state have made larger contributions than ever before for fire fighting this year. The fire danger season started early, but the timber owners put up considerable funds and provided a large force of rangers for work under the direction of State Forester Conzet and his staff. Some assessments of as much as five cents an acre for protection were made.

The representative of the American Tree Association found an aroused forestry sentiment in Minnesota. While the largest problem in the state is fire protection, a constitutional amendment will be submitted to the people this fall authorizing the passage of a forest taxation law encouraging the development of the farm woodlot and forest production. The state is well placarded with forest fire warnings, and the average Minnesotan thinks twice before he throws a cigaret stub into the roadside growth.

Fooling the Forest Fire

Although in the past the Weather Bureau has been cooperating in outguessing the forest fire, the scope of this work has been increased. The Washington Forest Fire Association offered to install recording machines to catch the weather's moods and to pay the expenses of men assigned to broadcasting these temperamental facts. This has been carried through. When the weather feels low in humidity and high in temperature, then comes danger. Now machines installed at ten points in Oregon, ten in Washington and sixteen in British Columbia provide daily reports concerning varying conditions. Since the conditions prevailing in the north generally work south, it is possible to know what to expect. In tackling a forest fire, an ounce of warning is worth an army of fire fighters.

Fire, the Enemy of the Future

Fire, the implacable enemy of the forest and the future, is a particularly active menace in the west this year. While the major problem in the big timber of the west is normally one of fire protection, this year the fields are baked yellow with a long drought and the forest floor is tinder-like. This has meant a busy and expensive season. While some of the reports of fires have been exaggerated, thousands of acres have been swept with a loss of both mature timber and young trees just trying to make their way in the world on previously logged-off land. Low humidity and high temperature, with breezes from the east, have resulted in many a discarded cigaret butt, careless camper's fire and scooting spark from a logging engine being fanned into a fast-running fire.

Cooperation to prevent carelessness and minimize the hazard, however, has done much to keep the loss from being tremendous. Working in the same harness, the United States Forest Service, the state forest services and the timberland owners' protective associations have been protecting with an effectiveness increased by teamwork. The publicity in the press has turned the attention of the people to the issue and an intensive course of education in protection and conservation is being carried on on a large scale and auguring well for the future.

Problems in the Lake States

Raphael Zon, director of the Lake States Forest Experiment Station of the United States Forest Service which was established last fall, is devoting much of his time this year to active field work. The first experimental planting was gotten under way this spring. In this work the station has the cooperation of the forestry school of the University of Montana. This joint work aids both the student foresters and provides the station with additional workers to carry on research and investigation.

A Few Record Acres

Twenty-eight million feet of lumber from a tract of 160 acres. This is what Washington Douglas Fir can do, perhaps even better in some of the stands of virgin forest, populated with trees some centuries old. The stand that produced this cut is not far from the entrance to the Mt. Ranier National Park. The stumps are still there, four and six feet across. But the stumps are blackened. Occasional remains of trees are left standing during the cut, gutted, charred and weird skeletons. Among the stumps very few young firs are pushing up.

"Keep the fire out," is the answer, not only for Washington but other of the northwestern and coast states with soil rich for timber.

Selling Forest Protection

"Keep Fires Out" is the urge that confronts one at every turn in the western states. Placards and warning signs are everywhere. You will likely receive a little blotter-warning in your telephone bill or gas bill. One billboard advertising company has turned over more than a score of full-sized boards to be devoted to a painting of hungry flames in tall timber. An oil company has turned many of its signs over to serve a similar purpose. Automobiles carry forest protection stickers. Your baggage may, also. Protection against flames, born of carelessness, is being sold to the people. They are acquiring securities to be paid in future forests.

Montana Seeks State Forests

Addition of some of the several hundred thousand acres of state land still remaining in Montana to the area of state forests is being urged in that state. The commissioner of the American Tree Association spent a day in the Bitterroot Valley with R. P. McLaughlin, Montana's State Forester. He saw may hillsides, once rich with timber, that now support a scattering growth and need some friendly help to regain their richness. Trees grow fast in the valley, both hardwoods and conifers, and Forester McLaughlin is convinced that the state can provide the needed help.

A New Instrument

The Telemagnifier, a new instrument for naturalists, might be considered as either a long range magnifier or a short-range field glass. It is intended for studying the habits of insects at sufficient distance so that they will not be disturbed in their activities. Two scientists, who wanted to observe the behavior of the insects without disturbing them, asked the scientific bureau of the Bausch & Lomb Optical Co. of Rochester, N. Y., to develop a suitable observation glass. The Telemagnifier was the result. So satisfactory in its operation did the scientists find the instrument that they asked that the instrument be made available for all naturalists.

Use the Whole Tree

With careful use of our forest resources forming one of the most important phases of the larger forest problem, work of outstanding importance to all the people is being quietly carried forward at the United States Forest Service Products Laboratory at Madison, Wisconsin. Utilization of the tree from tip to root and elimination of the present large economic waste, are the watchwords of the laboratory.

The representative of the American Tree Association had the privilege of spending an entire day at the laboratory under the instructive guidance of Miss Eloise Gerry, specialist in microscopic work and naval stores studies and the only woman member of the Society of American Foresters.

Preservation of wood by various methods, elimination of decay, utilization of poor woods for pulp, testing various forms of box and crate construction to determine which is strongest and will waste least wood, treating sawdust for use as a fodder, testing column strengths of wood and battling with the various diseases and fungi that attack wood, are only a few of the directions in which the laboratory is working.

Unfortunately Congress cut the appropriation for the Forest Products Laboratory work for the coming year, necessitating a further reduction in the personnel from the high point of the war, when discoveries that played no small part in the victory were made.

Forests Can Come Back

A forest may be down but it's never out. That is a part of the philosophy on which the Western Forestry and Conservation Association is working in offering to study timberlands of its members. The research department of the association goes over the lands, advising the owner what is best to do with it from the economic point of view. This is a valuable service for the present and the future.

Locking the Barn Door

Perched on the hill back of the University of California and Berkeley is a brand-new fire tower. From this height a watchful eye can be kept on forest fires. Berkeley has not forgotten the fire that swept up over the hill like lightning and was only stopped from leveling both this community and Oakland by a sudden shift of the wind. There is no disposition to take a chance on the wind a second time.

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The Herring Gull

In his book "The Protection of Birds," published by Longmans, Green & Co., Lewis R. W. Loyd says: "The natural food of the Herring Gull is fish. Failing fish caught by themselves in times of plenty, they found fish offal, thrown overboard from boats, an excellent substitute and more easily obtainable. Refuse and garbage, too, from sewers and drains served as a stop-gap. Wanderers searching for food on moors and uplands discovered that slugs were by no means to be despised as an article of diet, and having acquired a taste for these it was not long before they realized the advantage of following the plough and reaping a rich harvest of grubs and worms. Engaged in this occupation it was inevitable, whether by chance or design, that an occasional grain of wheat should creep into the bill of fare—and what is the consequence? To quote Thompson ('Biology of Birds,' p. 89): 'In the last quarter of a century in the north of Scotland it has become increasingly vegetarian, frequenting the farmers' fields and devouring turnips, potatoes, and the ears of corn from the shooks.' So bad is it in some places that, as I was recently informed, the small farmers have entirely given up any attempt to grow crops."

Butterfly Instinct

"The butterfly which lays its eggs on a special kind of plant in the absence of any experience derived from the observation of this action by others of its species, may be regarded as a typical example of instinct," says W. H. R. Rivers, in his book, "Instinct and the Unconscious," published by the Cambridge University Press, Cambridge, Mass. "An especially striking and often quoted example of this kind is that of the yucca-moth (Pronuba yuccasella) which, preparatory to laying its eggs in the ovary of the yucca plant, cuts open the pistil and stuffs into it the pollen from another plant, so that at one stroke it both fertilises and ensures the persistence of the plant, which is essential for the future welfare of its progeny. A still better example is given by the behaviour of the grub of the capricorn beetle (Cerambyx miles). After a larval life wholly spent in the channels which it manufactures within a tree, this creature, little more than a piece of crawling intestine, as Fabre says, makes elaborate preparations to ensure that after the pupal state it shall escape from the woody prison in which it has been for all its life immured. I call this insect a better example than the butterfly or the moth because it is quite impossible that the behaviour of the grub can have been in any way influenced by the imitation of its kind."

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	No. 41	No. 42
4¼-in blade, with sheath,	$2.50	$3.25
5-in. blade, with sheath,	2.75	3.50
6-in. blade, with sheath,	3.00	3.75
7-in. blade, with sheath,	3.25	4.00
8-in, blade, with sheath,	3.50	4.25

Waterproof Matchbox
Don't take a chance on carrying wet matches. The waterproof matchbox keeps matches perfectly dry under all conditions — even under water. Opened and closed instantly in the dark. Heavily nickeled, seamless-drawn brass, diameter about ¾ inch inside: **60 cents.**

Handy Compass
You can't afford to take a trip without a Marble's Compass. Waterproof screw case. Absolutely accurate. Can't demagnetize, **Safety Coat Compass,** fastens to coat or belt, stationary dial, **$1.50;** revolving dial, **$1.75. Pocket Compass,** stationary dial, **$1.25;** revolving dial, **$1.50.**

If you can't get Marble's Outing Equipment from your dealer's, we will fill your order direct.

Send for our 1924 catalog.

Marble Arms & Mfg. Co.
569 Delta Ave., Gladstone, Mich.
681

The Gentle Wood-Pussy

(CONTINUED FROM PAGE 142)

skunks had a hair-trigger disposition. He talked from experience. But he was no naturalist. I shifted a little where with one mighty kick, I could boost the skunk twelve feet over the bow of the boat. I had never boosted a skunk. I had always treated them with kindness. I was amazed how quickly he could swing around. There, of course, was danger that he might kick first.

"Don't kill him! Just shoo him away!" came from the lady behind. I was trying not to go to pieces. I was just a little confused. I couldn't make out whether the pussy understood my ardent love for animals. In another moment, the little beast had slipped between my feet and was sniffing at my shoes. He wanted to get on the back seat where he could run things.

"Why shouldn't we be friends?" He could be captain of the cruise, as far as I was concerned. I stepped cautiously forward and took the oars. I paddled rapidly and in a few minutes backed in to the other shore. With his eye on the land, the gentle wood-pussy climbed slowly over the stern and with a self-satisfied amble he steered his course up the rocky shore to the woods.

Tobacco—The Plant of Peace

(CONTINUED FROM PAGE 154)

prepared leaf or manufactured tobaccos their names, and their special uses.

In the sandy-loam soil of the Connecticut Valley, Gadsden County, Florida, and Decatur County, Georgia, are grown much of the wrapper leaf used for the outside of cigars. Much Cuban tobacco is grown in Connecticut under artificial shade for this purpose. In Wisconsin large quantities of leaf for binding cigars—holding together the filler of the cigar—are produced, and the Big Flats section of New York also contributes much of this leaf. From the Lancaster section of Pennsylvania and the Miami Valley of Ohio comes much of the cigar filler leaf.

Most of the dark-colored tobacco, cured by fire, is exported, although some of it is used in this country to be ground into snuff or made into a strong-looking wrapper for the chewing plug. This comes mainly from Virginia, Kentucky and Tennessee. The light-yellow tobacco found in some cigarettes in this country and in many abroad, comes from the Carolinas and the Piedmont region of Virginia. Most of the Maryland tobacco is exported, in large measure to France. There are, of course, various varieties designed for different uses produced in each tobacco section, and then, too, the manufacturers complicate the varieties by blending into different tobaccos with trade names.

So, from the day when the Indian chief-

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tains smoked their pipe of peace around the dancing campfire, to today when father smokes his after-dinner cigar in the easy chair before the fireplace, tobacco has played an important economic rôle. It has grown up with America and its influence and popularity have spread over the face of the world. It is possible that if a pipeful of the product of the plant of peace were to be passed around in the councils of the powers met to minister to the world's ills, there might be a lesser need of covenants and secret treaties.

The Evening Skies in September

(CONTINUED FROM PAGE 150)

America as "Terra Sancte Crucis," Land of the Sacred Cross.

Though less famous than the Southern Cross, our Northern Cross is one of the most interesting groups of stars in the northern hemisphere and one of the most easily recognized and remembered. It also lies in one of the most interesting regions of the Milky Way.

The most noticeable and beautiful object now in view is Mars, shining like a brilliant, red signal light in the southeast, in Aquarius. Even the giant planet Jupiter, still visible in the southwest, is surpassed in splendor by Mars at the present time. Mars has now made its nearest approach to the earth and is slowly receding in its orbit. On September 1 its distance from the earth is 35,000,000 miles. On the 31st this will have increased to about 43,000,000 miles. In the meantime its brightness will decrease until by the end of the month it will be very little brighter than Jupiter.

The south pole of Mars and its southern hemisphere is now turned toward the earth and winter is approaching in its northern hemisphere. The melting white polar cap is plainly visible, and many other interesting markings may be seen that change in color with the seasons and suggest the possibility of vegetational growth there. Mars is now nearer and more favorably placed for observation than it will be for many years to come, and many telescopes will be turned toward it this month as astronomers seek to solve some of its mysteries.

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BY

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Mr. Caldwell has just returned from a 4,000-mile tour in the desert country of Arizona securing autochromes of the flora and movies of desert life. The coming season his itinerary will be as follows: October, Colorado; November, Ohio; December, Pennsylvania; January, New York; February, Boston; March en route to Arizona. For terms and open dates, address

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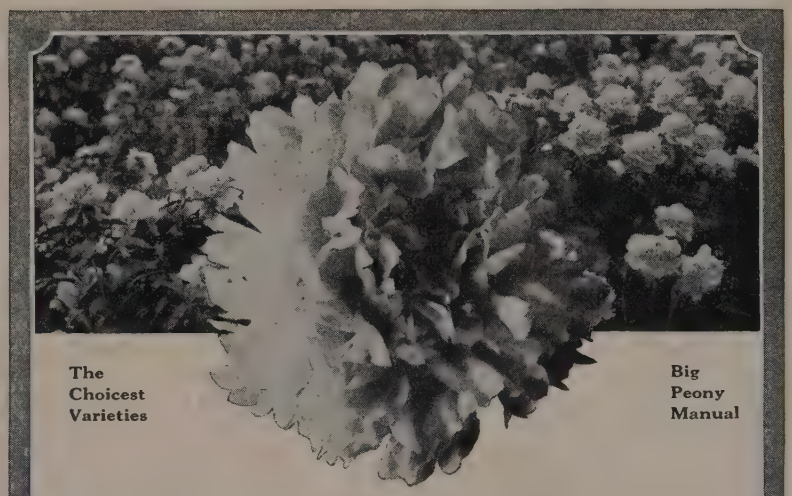

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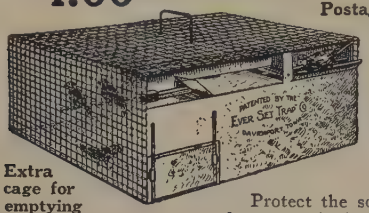

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Banner-Tail of the Bajadas

(CONTINUED FROM PAGE 182)

doubtless no accident that Banner-tail, though so mild and inoffensive in appearance, is unmistakably aggressive in defense of his rights. Once a strange kangaroo rat of the Banner-tail variety was liberated on the occupied den of one of his fellows. Happily excited over his new freedom, the newcomer at once dived into a large entrance burrow and was out of sight—but not for long. Something that happened on the inside brought about a sudden but decisive modification of his plans, and he immediately reappeared, making excellent speed, and never once looking to the right or to the left. Long after he was out of sight we could hear him whiz, as Mark Twain said about the jack-rabbit.

The stockman does not enthuse too much concerning Banner-tail. His saddle horse sometimes steps into the honeycomb of the den, throwing the rider and causing the breaking of bones. Furthermore, since one of the periods of kangaroo rat harvest falls during April and May, at a time when, in a drought year, the feed for range stock is shortest, the cow man concludes that the little rodent is getting away with some of the profits of the cattle business; and so he is. Damage by kangaroo rats to the principal grasses on the Range Reserve during the driest months may reduce by one-third the number of cows which may be carried on the affected pastures; and one cannot, in these days, reduce the stockman's capital by a third without very unfortunate consequences. So, all unconsciously, Banner-tail may be one of many factors in the increase of the price of beefsteak in New York, or Washington, or San Francisco, and so affect each reader of NATURE MAGAZINE. Thus it appears that some day, over vast areas where now Banner-tail is born, works, plays, and dies, he will be no more than a naturalist's memory; but in other regions, where Banner-tail does no harm, he may well be permitted to dwell unmolested.

Food from Flowers

(CONTINUED FROM PAGE 162)

care for the nectar. In the east and the north-central states, fruit blossoms, white clover and buckwheat furnish the nectar from which the honey for humans is made. In the south, Tupelo gum and other forest-tree bloom is the source. In the west, fruit blossoms, sweet clover, wild sage and alfalfa furnish the supply of nectar.

Would you suppose that the weather would make any difference to the honey crop? That is the third honey surprise, for it emphatically does. We have always known that the bees improved "the shining hours," but rainy weather is not the only kind that hinders them.

Late spring frosts that kill the fruit blossoms and other early flowers may greatly reduce the honey flow. An early, mild spring, on the contrary, may mean an early honey crop and a long season. Prolonged hot and dry weather cuts off the supply of nectar in the flowers so that the bees cannot make honey. Moderate rains will improve the condition and start the honey flow, but driving rains that beat down the plants and injure the flowers leave the bees as badly off as before. Sometimes causes are more indirect, for ravages of alfalfa weevil in a certain district may curtail the crop of alfalfa honey. On the other hand, the prevalence of heavy fogs along the California coast so protected sage plants from the generally prevailing drought last year that the sage honey crop in foggy areas was satisfactory, although the total California crop of the sage flavor was said to be only one-third of normal. Here foggy weather was more beneficial than sunshine.

When spring flowers fail and summer proves too hot and too dry, Dame Nature usually relents before too late. Last year, adverse spring conditions were followed by a long drought, so that honey prospects were pessimistic. Then came adequate rains followed by a bountiful flowering of buckwheat, goldenrod and asters, turning the late summer fields into a blaze of glory and the beekeepers' anxiety into smiling optimism.

The Bear

"When they are small, bear-cubs rarely go about alone," says H. Perry Robinson in his book, "The Life Story of a Black Bear," published by A. and C. Black, Ltd., London. "The whole family usually keeps together, or, if it separates, it is generally into couples—one cub with each of the parents; or the father goes off alone, leaving both cubs with the mother."

The Tiger

"One day my sister and I had a dreadful fright, when on looking up, we saw two bright, gleaming eyes staring at us out of the gloom," says A. F. Mockler-Ferryman, in "The Tiger," published by A. and C. Black. "We remained absolutely motionless and wondered what would happen next. Then the eyes gradually drew nearer and nearer, until at last we realized that they belonged to a leopard, whose spotted face we could now clearly distinguish. Silently we crouched lower and lower and then began to slither backwards, hoping thus to escape from the eyes; but as we retreated they ruthlessly followed. Often since I have wondered what the end would have been had not the great form of our mother suddenly appeared on the rock. Possibly nothing extraordinary would have occurred, as the leopard may only have been inquisitive or astonished at what he saw, for I can hardly think that he would have cared to make a meal off two wretched little tiger cubs. Whatever may have been his intention, the welcome arrival of the tigress made him vanish—not a little to our relief. I do not think that we were actual cowards, but my sister and I were very young, and this sort of thing upset our nerves."

The Cat

"A cat is, of all animals, the most difficult to know; it is so intimate, but so detached; so dependent on human beings for its comfort, so loftily indifferent to their wishes," says Violet Hunt in the "Life Story of a Cat," published by A. and C. Black, Ltd. It requires one who has lived with cats and seen their idiosyncrasies, their whims and their strong individuality, to write about them, and in the present author they have found a spokeswoman who knows them through and through. A sense of humor is necessary in dealing with the subject—and the humor is not lacking. Loki is a real cat in more senses than one, and those who follow his life story will find themselves better able to understand their own cats than they have ever been before.

The Acorn

"Every boy and girl knows what an acorn looks like," says Mrs. Ezra Bowen in her book, "The Story of the Oak Tree," published by The Chemical Publishing Company. "Haven't you ever found an acorn with a bulging, curly end made of tiny woody scales, and pulled the end off and hollowed out the nut to make a cup and saucer? Acorns from the red oak make the best cups and saucers, and acorns from the scarlet oak make the best tops for spinning. They are small tops, of course, but they whirl as merrily as any of your big, showy, painted ones.

"Every tree bears its fruit; just as the

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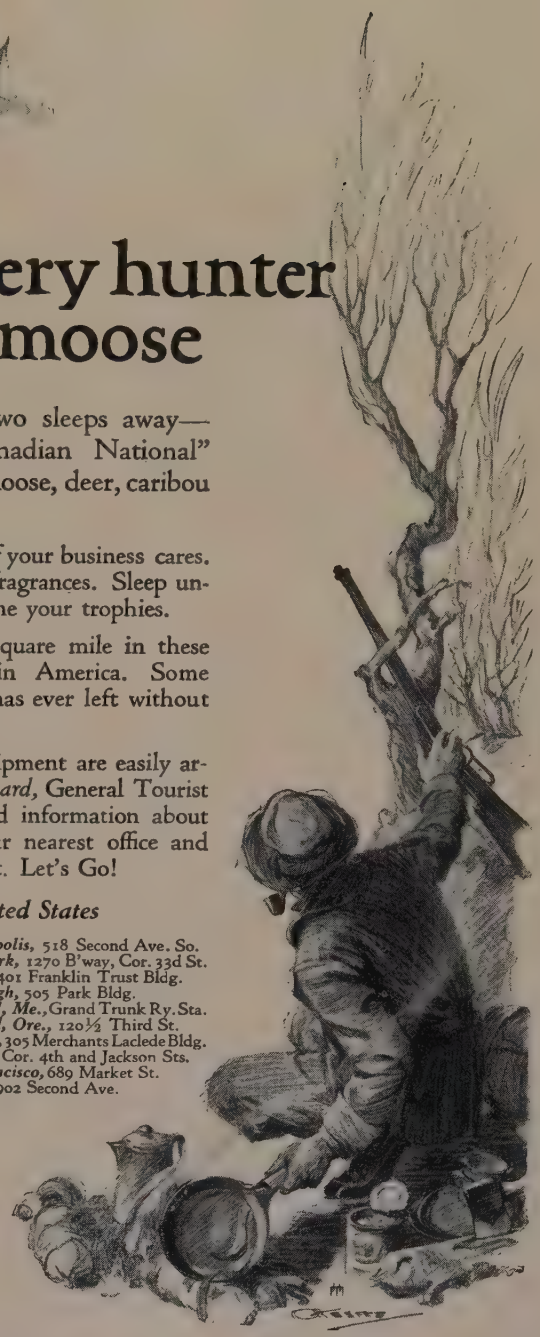

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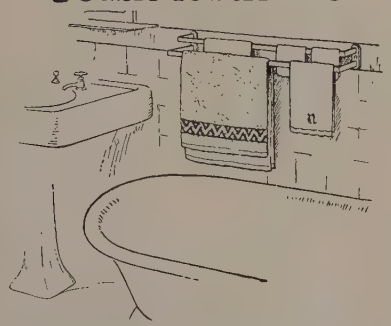

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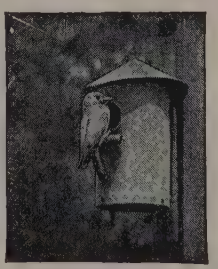

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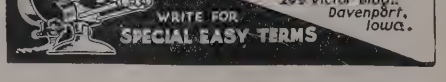

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apple is the fruit of the apple tree, so is the acorn the fruit of the oak. And in the fruit lies the seed. Warm and dry and protected, when in autumn the ripe fruit falls from the branch the seeds sleeps there in its acorn coat, waiting to be planted, waiting for spring and the feel of the moist earth pressing its sides to waken it once more to life and growth."

A Mystery Fish

"The Steelhead, mystery fish, at one time known as the species of salmon, and again as a trout, has caused as much, if not more, controversy among anglers as has the relative merits of wet and dry flies. Even Dr. Jordan has held different opinions at different times," says E. B. Webster in his book, "Fishing in the Olympics," published by The Evening News, Inc., Port Angeles, Washington. "It is now universally conceded that the Steelhead returns to the sea instead of dying after spawning, as do all species of salmon. The young live in the shallow water until four or five inches in length, when they go down to the mouths of the streams. Here they remain till the fall run, when they ascend the stream for winter. In salt water and for a time after entering the rivers, the Steelhead is of a beautiful lustrous silver, but soon the spots appear until, and especially in a shaded stream, they are hardly to be distinguished from the Rainbows."

The Lion

"Terrible days were those when the great teeth began to climb through the red gums, hours of agony when the tiny one lay with his burning head on his mother's side, and wished himself in the Happy Hunting Grounds chasing immortal oryx and glorified gazelle," says Agnes Herbert in her book "The Lion," published by A. and C. Black, Ltd., London, W. "Carefully the lioness tended him, for the death roll of the whelps

is very high during the dentition period, more particularly among the females, which makes it very splendid in later days for the fortunate survivors. In the lion world there are always enough husbands to go around, and a good few over. Different from the miserable working-overtime state of things existent with us human beings! Why can't our feminines toe the line more in teething, instead of the opposite being the case? What is Nature's reason for such provoking diverse freaks? She always has a reason."

The Daisy Starfish

"The Daisy Starfish is very fancy. It has a dozen or more arms in a row around its body. That makes it look like the daisy flower," says Ilsien Nathalie Gaylord, in her book, "Little Sea Folk," published by Little, Brown and Company, Boston, Mass. "And it is all covered with bands and spots of red and purple. Perhaps you can find one on the rocks in the shallow water at low tide. Then there are the little, bright red fellows, the Blood Starfishes. They are such pretty creatures in the water. But they fade out to pale yellow when they die. You must surely look for some of these gay little stars at low tide. You will find plenty of them in the pools among the rocks. Nearly all baby starfishes are hatched from eggs which their mothers have thrown out into the ocean. But these little red blood starfishes are not treated in that heartless way. The mother of a little family of these stars is careful and kind. She keeps her baby starfish eggs fastened around her mouth until they hatch. Even then she carries her wee babies about with her, until she is sure that they can safely take care of themselves."

Kodak Is Helpful

"The kodak is helping to save the wilderness," says Enos A. Mills in his book "Rocky Mountain National Park," published by Doubleday, Page & Co. "It is one of the most influential factors in promoting a more rational and refined view of the flowers, the birds, and the trees. It throws the robe of beauty artistically over everything. Through it the search is led for Nature's best; it reveals fairylands and develops an appreciation of the beautiful. The carrier of the kodak finds inspiration in Nature's garden and unconsciously becomes its protector. The kodak carrier is never cursed by those who follow after. It requires more skill to focus a kodak than a rifle upon big game; the triumphs of picture-taking are infinitely greater than the triumphs of the trigger. Picture taking will help soften and subdue the savage heart of man; it is destined to displace the rifle in outdoor literature, and will help the wilderness win our hearts. Some time the rifle's deadly echo will fade for the last time from the endless melody of the wild, while Nature's grand and varied bugle song will ebb and flow on forever."

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